THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

A JOURNAL OF THE

IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS

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CLEVELAND, O., NOVEMBER 20, 1890.

THE WEEK IN IRON CIRCLES.

General Features.

The iron market at large has had a general appearance of a stand-off the week past on account of the trouble in Wall street. Buyers of pig iron generally want to see how the flurry in stocks will affect general business before making large engagements. At the same time there have been several round orders placed for December and January deliveries at ruling quotations. It is not thought that prices can go lower for the reason that they have been at the bottom for several weeks past. It is felt that any artificial pressure that might further reduce values would result in wholesale blowing out of furnaces and consequent early reaction toward better figures. Production is already decreasing, the current rate being a quarter of a million tons yearly less than the rate of production in May and June. Further reduction in output is expected both North and South. There is no sign of any abatement of consumption, and it is thought that a considerable buying movement must set in before long. The week at Chicago has been marked by a considerable diminution of expected buying, sales during October were heavy and until within a few days indications pointed to a continuance of activity during November. Consumers, however, have formed the idea that they have little to gain by making further contracts before January 1st, and all things considered they prefer to take their chances after that date. Indications point to a quiet period during the balance of the year, and for the most part sales are likely to consist of small lots for near-by deliveries. Southern coke irons in the main are firm and but little doing, and the same remark applies to Northern cokes and Lake Superior charcoals. As there is little disposition on the part of sellers to force sales and consumers occupy a conservative position, there is little in the situation to cause fluctuation in prices either one way or the other. There have been several transactions consummated for Southern irons during the past week at Detroit at reasonably fair figures. The scarcity of cars is reported generally throughout the South, causing users here to desire their orders filled with promptness that there may be no danger of their running short. The reduction of stocks on hand noted during October, while it is small, still points in the right direction, and it is generally thought in Detroit that while the market may not advance for coke irons for some little time, it is certain that it will not decline. Lake Superior charcoal is in good demand at firm figures, although not as a rule for large tonnage to any particular buyer, but seems to be occasioned by manufacturers desiring to be certain of their supply and getting it shipped prior to the close of navigation. At Louisville a larger volume of business has been placed than for some two weeks preceding. Several individual orders ranging in quantities from 1,000 to 2,000 tons have been taken, particularly for irons for special purposes. Most of the trade is confined to legitimate requirements for a few months ahead, and in consequence buyers are not anticipating as largely for their future probable requirements as they would otherwise. Our Buffalo correspondent notes the fact that consumers busy themselves by telegraphing for delayed shipments on old orders and speculating on further decline in prices, although their contracts in many cases are very nearly completed. The St. Louis market is quiet and the general activity that so many predicted for the latter part of the year, has not developed. As nearly all consumers have contracted for the remainder of 1890, inquiries now are for delivery over the first quarter or half of 1891, and there are enough furnaces willing to sell ahead on present basis, to meet the limited demand.

Iron Ore.

While there isn't a thing in the way of news that may be said to affect the market, there is considerable speculation as to the causes that are responsible for the absence of reliable data concerning the lake shipments of ore, for the past two or three weeks. In some quarters the opinion is freely advanced that some one may be anxious to doctor the returns, though there is no earthly motive for such a step. The totals for the season will, it is thought hereabouts, come up closely to the forecast made in these columns last August, viz., 7,800,000 tons for lake shipments only. The stormy weather of the week has still further retarded the closing up of the business, and the shipments for the last two weeks in November are estimated at less than 300,000 tons. A very little patience will tell the story of the season's work.

Pig Iron.

After many weeks of disappointment and the patient endurance of a condition of affairs unparalleled in the history of iron making in this country, the furnacemen located in this neighborhood have at last taken steps to combine—not so much to affect the market directly, but to fight the common enemy, the coke combination. There has always existed in the Mahoning Valley an informal association of pig iron makers, but the Shenango Valley furnacemen have kept out of it. Now, however, that the interests of both districts are affected, and by the same cause, the iron manufacturers concerned have found it very much to their mutual interest to drop any differences that may have existed, for the purpose of meeting the emergency all together. At a meeting held quietly in Youngstown, one day this week, it was resolved that if a considerable majority of the manufacturers will pledge themselves to either shut donw their furnaces temporarily, or blow out for repairs, that course of action will be adopted at once. It is not deemed necessary that furnaces run in connection with mills should go out, as by puddling their own output they can make a little money, but about 75 per cent. of the productive capacity of the two valleys will have to be in the movement to make it a success. The fact cannot be disguised that despite the starvation prices which have obtained for a month or more, some of the furnaces have been stacking up considerable iron, and are not in the best condition as regards their ore payments. A shut-down, it is thought, will not only cut off their daily expense for coke, labor and freights, thus allowing them to use their funds in payment for the ore, but may have a tendency toward bettering the demand for pig iron. Nothing that has thus far been said or done seems to have the slightest effect upon the coke combination, and if nothing else can be done, it is thought that the accumulation, at Connellsville, of a considerable amount of coke, may have a tendency to convince the syndicate of the importance of keeping up the furnace business, which in turn depends for coke upon Connellsville. The chief reason hitherto given by the coke people for refusing to lower their prices was that the trade consumed every pound of coke made, so that, if the movement above outlined goes into effect, the cokers will no longer be able to boast of the great demand existing for their output. To show the great loss already sustained by the furnaces in this district, and, incidentally, by the lake ore interests, it is only necessary to quote the opinion of one of the best posted iron men in the Mahoning Valley to the effect that fully 25 per cent. of the pig iron now consumed there is Southern iron which, while inferior to our own make, is yet sold for so much less, that there is a profit in mixing it with a stronger Northern iron. The ore interests, it may be added, are with the furnacemen in this fight, and if the combination against the coke barons goes into effect, some lively times may be expected.

HIGH AUTHORITY ON PIG IRON WARRANTS.

We dislike to revert to a well-worn subject, and especially to re-awaken a controversy which our Chattanooga contemporary, *The Tradesman*, appears to have wisely abandoned, but a recent editorial which in no less able authority than the New York *Commercial Bulletin* so fully confirms the position maintained by *The Iron Trade Review* from the very inception of the pig iron warrant gambling scheme, that we cannot refrain from some reference to it. It will be recalled that the Chattanooga champion of the New York manipulators denied that the scheme was essentially, or even incidentally, speculative. On the other hand, we have cited the documents of the warrant company itself to show that speculation was one of the primary objects. The *Commercial Bulletin*, it appears, has gotten hold of some additional literature issued by the warrant company which gives the whole scheme away. We cannot do better than quote its article as follows:

It is entirely natural that the Pig Iron Warrant Company should object to comments upon passing events which tend to show that its organization and operations are contrary to the true interest of iron producers. It is much pleasanter for a public journal to gratify enterprising and influential men, when it can without diregarding the public interest. But the arguments which the Pig Iron Warrant Company employs to justify its operations would suffice to convince an unbiased mind that such operations can only injure iron producers and the public, even if the painful experience through which manufacturers in Great Britain are now passing were not impressively teaching the same lesson.

The company states in its circulars that its "primary and distinct object" is to promote the "purchasing and dealing in pig iron by the investor," who is called on the next page with more correctness "the speculative investor," and who is in plain English a mere speculator. He does not invest at all, looks for no interest from an investment, has no idea of holding or using the property, and is simply buying with the hope that by force or good fortune he can get more for iron than he pays. It is admitted that the so-called investors are not consumers, and have nothing that they can do with the iron itself, for a circular says, "investors will not buy if they are obliged to handle the commodity itself. The consumer only will do this." The kind of investors meant here are those to whom iron certificates are only counters in the game.

It is this kind of "investor" who contrives corners in wheat and cotton, and causes a perpetually diseased state of markets by his manipulation. This is hardly denied by those who send out circulars of the Warrant Co., for they say that systematic dealing on an Exchange, will have the effect of limiting fluctuations, "if we except an occasional manipulation which will not last more than 20 or 30 days." It needs some courage to make this remark. During two years of the last three, manipulation of the wheat market has kept prices for four or five months each year so far above the parity of Liverpool that exports were practically forbidden, and the country was doomed to carry a heavy surplus unnecessarily. In two years out of three, corners on cotton have controlled the world's markets for more than 30 days each. The same results have appeared in every market which speculation governs, as all intelligent readers are well aware. Once a holder, the speculator exhausts all the resources he has or can borrow in a desperate effort to force the world to pay him a profit, whether there is any reason on his side or not.

The speculators can make money, on the scale that speculators desire, only by controlling a market against the public expectation. In order to sell or buy great quantities, they usually must have the public on the other side. Thus it comes to pass that a speculative market for products is in its nature a false one. It encourages production to increase just when, in due regard for public interests, it should be restricted, and forces it to diminish just when public needs require it to increase. Even this is not denied by the Warrant Company's circulars, which say that the worst competition "is the forced sales of furnaces who (sic) have not sufficient capital to carry their iron until buyers want it," and therefore, are compelled to sell at a sacrifice or else to stop work because buyers do not appear. But when iron accumulates and buyers do not appear, that is nature's warning that the production is overdone, and some furnaces ought to stop. So the only reliable assurance makers can have that the market requires more production is a natural rise of prices. But the speculator is disposed, by the very nature of his business, to give this information falsely at the very time he desires to unload, and therefore seeks to get the public to buy.

The circulars affirm that objection comes only from those who have not tried the warrant plan, and that all who have tried it are most enthusiastic in its praise. This does not accord with the facts which we have printed, regarding the results in Great Britain, where the warrant system has been thoroughly tried for many years, and has brought such serious and long-continued disasters that the furnacemen themselves are organizing to break it up. It may be freely admitted that an accumulation of millions of tons, such has been hanging over the British market, will not easily be formed here. American producers are not yet trained to go on producing for a market which they know to be purely speculative and "extra-hazardous," and it is to be hoped that their education in that direction may long be neglected.

Nothing that we could say would add to the stinging force of the above. That the "primary and distinctive object" of the company is to promote the "purchasing and dealing in pig iron" by the "speculative investor," *i. e.*, the speculator; that its legitimate fruits are "occasional manipulations" of the iron market by unscrupulous persons, and that it "encourages production to increase just when, in due regard to public interests, it should be restricted, and forces it to diminish just when public needs require it to increase," must appear evident to any one except a prejudiced and purblind defender of the system. We quite agree with the *Bulletin* in believing that American producers will let the scheme severely alone, as it deserves.

IRON DIRECT FROM THE ORE.

While due credit is to be awarded English inventive genius for the discovery of the Bessemer and other processes for the production of steel, it may be possible that the United States has just brought out a process that, for the time being at least, throws all preceding discoveries in the shade. We refer to the Adams process of reducing iron direct from the ore, reference to which has from time to time been made in these columns. That the new process is cheap, effective and practical as now stated by such high metallurgical authority as Mr. George J. Snelus, F. R. S., will attract widespread attention. As the result of recent investigations, Mr. Snelus writes the *American Manufacturer* a strong letter, from which we take the following paragraph:

It is perfectly clear that there must be a very great economy if 50 per cent. of the steel ingot can be got from ore costing, say $7.50, counting 65 per cent. iron (with less than $1 per ton as the cost of reduction), in place of pig iron at $17 per ton. It appears to me also that the process will be even more advantageous when carried out on a basic hearth. Even with the acid process the purity of the product must be greater than by the ordinary method, because it is well known that the phosphorus in the ore is not reduced at the low temperature employed, and only a portion of what the ore contains can in any case enter the steel, so that I am not at all surprised to learn that the steel made by this process is exceptionally low in phosphorus. To conclude, I really think this process is extremely promising, and that it has got well beyond the experimental stage, although minor improvements may yet be made in detail.

Commenting on this letter, the *American Manufacturer* calls attention to the following important point:

The great objection to this process by those not understanding it, is the large amount of silica that is thrown into the open-hearth furnace at the time that the charge is dropped. It will be noted that Mr. Snelus says that the process will be even more advantageous when carried out on a basic bottom than when carried out on the acid hearth. This will certainly be a surprise to most of our readers, and if it is true, as we have no doubt it is, having such an eminent authority as that of Mr. Snelus to support the statement, the possibilities before this process are unbounded, as it will permit of the employment of the high phosphoric pigs of the South, the phosphorus of the pig being removed by the basic lining, while the phosphorus of the ores will be removed as in the present Adams process, on an acid bottom, by the melting of the slag and the bleeding of the same.

From all of the foregoing it would appear that our Pittsburgh contemporary is not far from the truth in claiming that the process under development is one of the most important inventions of modern times.

COINCIDENCE OR CONCERTED ACTION?

At least one large iron plant in the United States owned by British capitalists chose a few days before election as an appropriate time to lower the wages of its workmen. Whether this was done by any other Anglo-American concerns we are not advised. Certainly no time could have been chosen that would have had a more immediate effect upon the election than this. Whether the owners were justified in thus reducing wages, or whether the American managers counseled or agreed to such course, it is not for us to discuss; suffice it to say that the actual owners were Englishmen, and the day chosen for the disheartening announcement was just on the eve of an election in which the tariff bill was the leading point of attack all along the line. In so far, therefore, as the lowering of wages might breed dissatisfaction (however unjustly) with the new law, it had the effect of aiding in the sweeping reversal of the elections of two years ago. Do these British owners of American plants care a whit whether the American policy of Protection is sustained or overthrown? It looks, indeed, as if they had acted with a full view of the possible effects, and that these effects were a part of a general plan. We do not say that this is so, but to a man up a tree it looks very much that way. Long ago, when American plants first began to disappear down the capacious maw of British capital, we called attention to the possible political results of such transference of ownership to our industrial competitors. This may be the first harvest of possibilities then outlined.

A FRENCH TARIFF AGAINST ENGLISH TINPLATE.

The United States is not the only country that proposes to set up for itself in the tinplate business. France, also, has its eye upon the main chance, and will doubtless soon fall into line as a producer of its own tinplates. A proposition now pending in the Chamber of

Deputies will, if adopted, prove a veritable prohibition of the import into France of the English article. The existing customs duty of 12 francs ($2.40) per hundred kilos. is nearly prohibitive, but the future minimum duty of 12 francs upon thick tinplates and 13 francs ($2.60) upon thin tinplates will be altogether prohibitive; as regards future duties of 14 francs and 15 francs of the tariff-general, they are absolutely so, because they will be from 43 to 45 per cent. *ad valorem*. The import duty on English tinplates in different European countries is as follows:

Country.	Duty per 100 kilos.	Country.	Duty per 100 kilos.
France	$2.40 to $3.00	Turkey	.60
Denmark	.30	Germany	1.25
Belgium	.60	Sweden	Free
Servia	.60	Holland	"
Switzerland	.60		

Verily, the Welsh tinplate makers are in hard lines these days, but they will doubtless find new markets in time.

WILL CANADA MAKE ITS OWN NICKEL STEEL.

Through the courtesy of Mr. J. J. Cassidey, editor of the *Canadian Manufacturer*, Toronto, we are indebted for an advance proof of an important proposition recently submitted to Sir John A. MacDonald, Prime Minister, by Mr. S. J Ritchie, of Ohio, President of the Central Ontario Railway. As will be seen, Mr. Ritchie's proposal is, first, that the Government aid in the completion of the Central Ontario road from Coe Hill to Sudbury, the bonus to be of the usual amount, $6,000 a mile; and, secondly, that a guarantee of three per cent. be given on the stock of the steel plant. Of the Central Ontario road 110 miles is already built. It will be necessary to add 210 miles, and to build 30 miles additional to connect the various mines with the smelting plant. Thus, the subsidy asked approaches $1,500,000. The capital necessary for the operation of the mines, and the purchase and setting up of the plant, which is to be of the capacity of ten furnaces, is $5 000,000. The guarantee at three per cent. will therefore involve an outlay of $150,000 a year. Mr. Ritchie's figures show that these subsidies will lead to the investment of $16,000,000 in the country beyond the two and a-half millions already spent in the building of the Central Ontario road so far as it has gone. As the owners of the iron and copper mines are largely Ohio capitalists, and as there has been some talk of locating the proposed smelting works at or near Cleveland, the proposition, which is as follows, will be doubly interesting:

"On numerous occasions during the last six years I have asked the Government to aid the Central Ontario railway in extending its line from Coe Hill to Sudbury. During the greater portion of the period there were many questions in connection with the metal interest of the country to be traversed and to be reached by the completion of this line which were only partially solved, and the success of the line when built thus rendered somewhat problematical; and to this cause I have attributed the failure of the Government thus far to comply with my request. Happily now, all these obstacles have been overcome and mastered, and the development and manufacture of these minerals in Canada has become a question second in importance to no other commercial question in the Dominion.

"By cheap and simple processes even very low grades of magnetic iron ores can be converted into the highest and purest grade of steel which is offered in any of the markets in the country and they are thus well adapted for the manufacture of the very best quality of steel In addition to this, you doubtless are well aware of the great revolution in metallurgy, recently made known to the public, by the alloying of nickel with steel, the product being known as nickel steel.

"Nothing in the manipulation of metals, since the discovery of Sir Henry Bessemer, has created such widespread interest among the steel manufacturers of the world as the results obtained from this nickel steel. Wherever it will be possible to obtain this material the war vessels of the world, together with their armament, will doubtless be made from it. This statement I have from the highest officials having these matters in charge.

"Its extensive use for commercial purposes where a metal of superior excellence is required is equally well assured. Canada possesses probably five-sixths of the world's supply of nickel. Such being the case, she can control the markets of the world, and the uses to which this metal shall be applied. She also has inexhaustible supplies of iron ore, which, until the invention above referred to, were neither available for manufacture at home nor saleable abroad.

"The comparative close proximity of these iron ores to these nickel deposits, both of which are in inexhaustible and almost incomputable supply, would seem to render any argument unnecessary as to the proper use to which they should be put. That they should be manufactured in Canada, and the manufactured material shipped to the markets of the world, instead of only the crude materials being produced in the country and shipped to foreign markets, would seem to be a question susceptible of only one answer.

"After having mastered a solution of all these metallurgical questions and processes, after their importance has been acknowledged and passed upon by the highest authorities in the world, including, among hundreds of others, the owners and managers of the great steel works of Schneider & Co., of Le Creusot, France; the great works of the Steel Co., of Scotland; of the world-wide known works of William Jessop & Sons, of Sheffield; of the results obtained by experiments and tests made in the interests of the French, German, Austrian, British and American Governments, I again come to you and ask your aid, not only for the completing of this line of railway, but also for the building up of a great steel plant which shall produce an article which can be shipped to and find a purchaser in every market in Europe. It may be said that the natural advantages here should be sufficient inducement for either investors or manufacturers without any Government aid, but you must remember that Canada is without any industry of this kind, and that her facilities and resources are not well understood by people of other countries where these industries are developed on a great scale, and no matter what her advantages are or may be it would be impossible to induce capital sufficiently large to engage in an enterprise of this kind without some Government backing. If the same opportunities, even in a small degree, existed in the United States, Great Britain, Germany or France, capital in any amount required could at once be had to utililize and develop them. But the conditions here at present are different, and if Canada is to take her place among those countries which are producers of manufactured articles instead of a producer of raw materials, the Government must take the initiative and help those who are willing to engage in and push through this enterprise.

"I therefore ask of your Government, on behalf of the Central Ontario railway, a bonus of $6,000 per mile from Coe Hill to Sudbury, a distance of about 206 miles; and that you grant a bonus of $3,200 per mile on the portion of the line already completed between Trenton and Coe Hill, a distance of about 72 miles; this last sum to be used in the building of blast furnaces upon the line of railway.

"For the purpose of erecting and carrying on a large steel plant upon the line of railway for the manufacture of nickel steel from the iron ores along the line of road, and from the nickel ores of the Sudbury district, I also ask your Government to guarantee the interest at the rate of three per cent. per annum on a capital stock of $5 000,000 for a period of ten years, and in order that we may at once perfect our negotiations for carrying out this enterprise, would most respectfully ask that your Government pass an order-in-Council granting this aid, under such safeguards as shall insure to the Government their successful completion and carrying out.

"If the Government shall be pleased to make these concessions to the interests I here represent, a great industry will at once be built up in Canada, and she will sell to the markets of the world a manufactured article instead of raw materials. She will find a market for her labor at home, with a growth of all the varied interests which spring up around such large manufactures. To illustrate the possibilities of a great steel plant, I may say that the business of Carnegie & Co.'s firm, at Pittsburgh, during the present year is much larger than the combined business, during the same time, of every mile of railway and steamship owned or operated by both the Grand Trunk and Canadian Pacific railways, both in Canada and the United States. Yet the sources from which this great firm derives its supplies of raw materials are, in the aggregate, but a small percentage of extent to those to be opened up, connected and made available by the extension of this line of railway. The several interests in this railway, and in the iron, nickel and copper mines which it will bring together, will all be pleased to heartily co-operate with your Government in building up

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES.

November 1, 1890.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

LOCATION OF FURNACES.	CHARCOAL. Total No. of Stacks.	CHARCOAL. In Blast. No.	CHARCOAL. In Blast. Week'y capacity.	CHARCOAL. Out of Bl'st. No.	CHARCOAL. Out of Bl'st. Week'y capacity.	BITUMINOUS OR COKE. Total No. of Stacks.	BITUMINOUS OR COKE. In Blast. No.	BITUMINOUS OR COKE. In Blast. Week'y capacity.	BITUMINOUS OR COKE. Out of Bl'st. No.	BITUMINOUS OR COKE. Out of Bl'st. Week'y capacity.
New England	13	7	649	6	398					
New York	9	2	306	7	847	6	2	1,388	4	2,801
Pennsylvania	17	6	445	11	611	1	0	0	1	600
Upper Susquehanna Valley						1	0	0	1	200
Pittsburgh						22	18	25,124	4	4,286
Spiegel						1	1	890	0	0
Allegheny Valley						1	1	531	0	0
Shenango Valley						19	16	12,275	3	2,219
Youghiogheny Valley						5	2	871	3	1,405
Juniata and Conemaugh Valleys						19	12	6,316	7	2,193
Spiegel						1	0	0	1	250
Maryland	7	2	166	5	528	4	2	2,775	2	290
Virginia	17	4	187	13	697	12	11	5,930	1	264
North Carolina						1	1	100	0	0
West Virginia	2	0	0	2	130	6	3	2,834	3	840
Ohio—Mahoning Valley						14	11	9,132	3	2,012
Eastern, Central and Northern						17	16	12,509	1	562
Hocking Valley						14	5	1,736	9	2,341
Hanging Rock	12	7	512	5	495	13	8	1,842	5	864
Miscellaneous										
Kentucky	1	1	75	0	0	5	3	842	2	720
Hanging Rock										
Western Region and Miscellan'ous										
Tennessee	8	5	1,230	3	260	12	10	4,338	2	800
Georgia	3	2	311	1	98	2	1	675	1	461
Alabama	15	11	2,423	4	1,163	33	25	15,497	12	7,430
Indiana						2	2	3 0	0	0
Illinois						15	14	14,305	1	350
Michigan	27	14	4,653	13	3,516	1	0	0	1	300
Wisconsin	6	3	1,518	3	620	4	3	2,5 5	1	422
Minnesota						1	0	0	1	140
Missouri	2	2	751	0	0	6	1	824	5	2,91
Texas	1	1	179	0	0					
Oregon	1	1	321	0	0					
Colorado						2	1	440	1	350
Utah										
Washington	1	0	0	1	205					
Total charcoal and coke	142	68	13,726	74	9.578	244	169	124,059	75	35.749
Total anthracite	173	165	42 670	68	19.814					

SUMMARY.

FUEL.	IN BLAST. Number.			IN BLAST. Weekly Capacity.			OUT OF BLAST. Number.		OUT OF BLAST. Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	68	66	70	13,726	13,411	13.257	74	74	9,578	8,908
Anthracite	105	103	98	42,670	40,567	38,181	68	71	19,844	21,137
Bituminous	169	168	161	124,059	122 205	111,279	75	76	35.749	33 804
Total	342	337	342	180,455	176 783	162,717	217	221	65,171	63,849

a great industry in your country, if, by your aid, you will make it possible for them to do so. This whole subject in all its bearings and connections is quite well understood by your Government, but in order to place the matter in, at least, approximately definite form before you, I submit the following figures as illustrative of the importance of the enterprise for which I ask your aid:

Line of Central Ontario—110 miles already completed, with equipments	$2,500,000
Line to be built, say 210 miles, with equipment	6,000 000
Capital for steel plant	5,000,000
Capital for working the copper and nickel mines with a capacity of ten furnaces and about thirty miles of railway to connect all the various deposits with the central smelting plant, together with all the necessary machinery, houses and plant of every kind adapted to a capacity of ten furnaces, as well as to provide for the working of the iron mines, at least	5,000,000
	$18,500,000
To recapitulate, then, I ask of your Government, first a direct bonus to the railway of, say (about 320 miles when completed)	$1,500,000
This would involve to the Government an annual interest charge of about.	$ 50,000
The guarantee of five millions of stock for steel plant at 3 per cent. per annum for ten years—this would involve an interest charge upon the Government of	150,000
Or a total interest charge for ten years of	$200,000
And of $50,000 per year thereafter.	

"From such knowledge as you have of the importance of like industries in other countries, I submit whether your Government has ever incurred an obligation of like magnitude which promises so much in return for the develment of your country, and I most earnestly urge your speedy and favorable action that we may be enabled to close our negotiations, and to proceed at once in building up and carrying out this whole enterprise."

IRON MAKING IN NOVA SCOTIA.

At a special meeting of the St. John Board of Trade, held last week, to consider means of getting the Iron and Steel Institute members to visit St. John, it was announced that none of them could come. The gentlemen present far from repining at this disappointment, resolved to discuss, and did discuss, the question of iron works in St. John. Mr. Edward Jack, C. E., addressed the members on the mineral resources which lay around them. A need being felt for the better knowledge of the iron ores and fluxes of the Bay of Fundy region, the Dominion Government was asked to engage Ernest Sjostedt to examine and report upon them. This gentleman, a Swede, is a graduate of Stockholm school of mines, a practical metallurgist, and has been making iron for ten years in America, part of the time as manager of the Katahdin works in Maine. The Government declining, some gentlemen in St. John and elsewhere, defrayed the expenses of two months' exploration by Mr. Sjostedt, on the Bay of Fundy coast. A very valuable report was the result.

Although the Geological Survey had done admirable work, there is force in Mr. Jack's contention that this should be followed up by definite exploration by practical men who could tell the economic value of each deposit. He went on to tell of a bog iron ore deposit, below Fredericton, which "would make good car wheel iron, and could be delivered at St. John for about $2 to $2 50 per ton. It was better than that at Woodstock or Nictaux, and probably as good as Katahdin, in the heart of Maine. There was a deposit of magnetite on Bartholomew's river of probable great value, and a less valuable one in Gloucester county." But the most important statement made by this gentleman was that using iron ores from the Bay of Fundy, fluxes from St. John, and charcoal from points along the New Brunswick railway, charcoal pig iron could be manufactured at St. John for $15.50 per ton. This allowed $1 for depreciation of plant and for repairs, and included the bounty of $2. And by mixing ores that are known to exist, the product would equal the best Swedish.

From some remarks by Mr. A. Markham on that occasion we gather that in his opinion, the figures quoted by Mr. Jack, as above, are correct. According to Mr. Markham, car wheel iron cost about $33. The work of Mr. Sjostedt is most remarkable in the discoveries of iron ore made, especially on the Nova Scotia side. That gentleman, by the way, while manager of the Katahdin Works in Maine, imported limestone from St. John and manganese from Sussex.

The difficulty with the Woodstock and Nictaux ores was the presence of phosphorus. So says Mr. G. F. Mathew, who adds that some of the ores up the St. John River are rich in manganese. The deposits at Londonderry and the Cobequid Hills are carbonates and probably free from phosphorus. So probably is the Bartholomew's River deposit. Magnetic ores generally are. "But magnetic ores are hard to smelt, and for that reason the mixtures of bog ores is very desirable. There are fair indications of an iron deposit at Quispamsis. As to limestone, St. John had great deposits. There were also easy facilities for securing coal, and while perhaps not as favorably situated as Londonderry for the reduction of ores, the business could probably be carried on successfully." At all events, in his opinion, St. John was a good place for the establishment of smelting furnaces for the second process in iron manufacture.

Very confident was Mr. Andre Cushing of the advantages of St. John for iron making. It is better than Halifax for that purpose anyhow, he says. And he spoke of the valuable deposits at Whycocomagh, which is easily worked, has but little phosphorus, and, "when the marine railway is completed will be at our doors." Some thoughtful remarks were made by Mr. Markham in closing He drew attention to the fact that at Sparrow's Point, near Baltimore, where there was neither ore nor coal, great blast furnaces had been erected. The place was chosen because of its facilities for procuring these by vessel. "The work of the chemist is now the most important one in connection with blast furnaces. No iron or steel is now made from any one deposit. The different ores are mixed in the desired quantities to produce any particular grade, and the work of the chemist is therefore the most important." There is now talk of establishing big furnaces on the Jersey flats, near New York. The United States imports immense quantities of ores from Spain and Cuba. If, therefore, ores can be found, as believed, in large quantities, along the Bay of Fundy, St. John is a desirable place for the establishment of blast and smelting furnaces.—[Monetary Times, Toronto.

IMPORTANT FUEL TESTS AT PITTSBURGH.

SPECIAL CORRESPONDENCE.]

An interesting phase of the natural gas question that is brought to prominence by the action of the Philadelphia Co., of Pittsburgh, in shutting off the gas from the puddling furnaces, is the exhaustive experiments made by the Fuel-Gas & Manufacturing Co. to ascertain the comparative values of natural gas, fuel gas and coal, in the ordinary puddling furnaces, and to compare these with the results to be had in the most improved form of regenerative furnaces of the Siemens type. The tests were made in the pipe mill of A. M. Beyers & Co., the utmost care being used to secure absolute accuracy; each test extending over a week's time. The results of these tests are given in an official report to the company which we are able, through the courtesy of Mr. Bannister, General Manager of the company, to lay before our readers. The report says:

"The amount of any quality of gas necessary to puddle a ton of iron will vary inversely with its calculated calorific value, provided that the combustion is equally perfect, and the apparatus in which the puddling is done is in each case equally well designed. It also appears that when coal or natural gas is burned in the same apparatus, and without any more attempt at economy in one case than in the other, to perform the same work, that about 25,000 cubic feet of natural gas will be burned as an equivalent of a ton (2,000 lbs.) of Pittsburgh coal. In the ordinary puddling furnace it takes about a ton and a third, or about 2.700 pounds of coal per ton of iron puddled; this amount of Pittsburgh coal contains about 36,000,000 heat units, and it was found that the ordinary furnace burning the natural gas in the ordinary manner, consumed about 33,000 or 34,000 cubic feet per ton of iron puddled. We did not analyze the gas, but for convenience have assumed that the average calorific value of natural gas, as calculated from a large number of tests, 1,100,000 per 1,000 cubic feet of gas, and that, therefore, it took about 36,300,000 heat units to puddle a ton of iron with natural gas in the ordinary puddling furnace, designed to burn coal in the ordinary manner.

"After remodeling the furnace on the Siemens' regenerative plan, with certain alterations for convenience in getting at the checker work, and with only single regeneration, *i. e.*, regenerating the air only, a test was made to determine the amount of natural gas required to puddle a ton of iron. This test developed the fact that it took about 13,250 cubic feet of natural gas to puddle a ton of iron in the remodeled furnace, or calculated into heat units 14,575,000 heat units, or, a saving of 60 per cent. The above amount of gas is an average of a week's run on the furnace. After these tests were made, gas was made at the plant of the Fuel-Gas & Manufacturing Co. with the following results, in this puddling furnace. The first tests were made with a gas containing 297,375 heat units per 1,000 cubic feet, and the average amount of gas necessary to puddle a ton of iron was found to be 47,300 cubic feet, or 47.3 × 297,375 = 14,065,837 heat units.

"It was next decided to test a gas of less calorific value, and consequently a gas containing 266,400 heat units per 1,000 cubic feet was made and delivered to the furnace. The average amount of gas necessary to puddle a ton of iron in this test was found to be 54,100 cubic feet, or, 54.1 × 266,400 = 14,412,240 heat units.

"*Resume.*—From the above tests it will be seen that it requires about 36,000,000 heat units to be fired in the ordinary furnace to puddle a ton of iron, and about 14,000,000 heat units with a properly designed regenerative furnace."

The following table gives the result of the tests in a condensed form:

SINGLE REGENERATIVE PUDDLING FURNACE.

Gas.	Iron. Pounds.	Amount. Gas.	Heat units per 1,000 cubic feet of gas.	Heat units per ton of iron puddled.
Natural	2,240	13,250	1,100,000	14,575,000
Fuel gas	2,240	47,300	297,375	14,065,937
Fuel gas	2,240	54,100	266,400	14,412,240

The above reports show conclusively that by the adoption of the regenerative furnace, and converting the coal into a fuel gas to use in the same, that one ton of coal can be made to do the work that is now done with two, that is, allowing that the fuel gas made from the coal for use in this way shall contain all, or practically all, the heat units contained in the coal, a result that, it is claimed, is practically attained by the most approved apparatus used in the manufacture of fuel gas. A. L. D.

PITTSBURGH, Pa., Nov. 17, 1890.

Profit Sharing.

Profit sharing with employees appears to be growing steadily in favor among manufacturers. Another large Chicago establishment announced its adoption last week. Of course the millennium has not yet dawned, and a new dispensation cannot be predicted merely because some converts have been made, but it is certainly gratifying to note the increasing disposition of employers to cultivate pleasant relations with their workmen. And in no way can pleasant relations be cultivated with a surer prospect of getting a good crop than through the agency of a substantial pecuniary benefit. This does not imply mercenary motives on the part of a workingman any more than in the case of any other class of people. All are striving for the mighty dollar because of the advantages to be gained by its possession. Profit sharing must necessarily make a workman take a deeper interest in the operations of the concern employing him than if he merely received the market rate of wages, no higher and no lower than those paid in other works around him.—[Metal Worker.

IT has been decided by the official inspectors of the School of Mines, at Madrid, Spain, to appoint a professor to instruct the pupils in the applications of electricity to mining and metallurgy.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

GOGEBIC RANGE.

The largest shipments from any one mine come from the Norrie. Up to October 1 over 900,000 tons alone were shipped from this mine, and the owners say it will reach over 1,000,000 tons before the season's close. This will be the largest shipment from any single mine in the world in the same time.—[Milwaukee Sentinel.

VERMILION RANGE.

If the management of the Minnesota Iron Co. have at some time resolved to make their plant one of the finest in the Lake Superior district, they certainly are well on the way of accomplishing it. With their recent improvements in the way of new air compressors, new hoisting engines, fire-proof buildings, and the numerous appliances and improvements underground, the place is scarcely to be recognized from its appearance a year ago. The equipment of this great mine is daily becoming more complete, and a visit to it is not only of interest to the casual observer, but to the practical mining man who finds pleasure in beholding a great property being worked with all the latest appliances and conveniences.—[Vermilion Iron Journal, Tower.

MENOMINEE RANGE.

The work at the Baird exploration, near Keyes Lake, is satisfactorily progressing, and the property continues to look better and better as the days and weeks roll by. The shaft is now down 50 feet in black magnetic ore, which, though good from the very start, shows a constant and steady change in quality from non-Bessemer to Bessemer as greater depth is attained. At the present gratifying rate of improvement, the ore at the Baird find will easily come within the extreme Bessemer limit long before the shaft is down the 100 feet which the company design to sink it. The drilling is exceedingly slow, laborious and expensive, so hard and flint like is the wonderful product.—[Florence Mining News.

Capt. James Tobin, of this city, has begun exploring on section 12, 45-35, next to Fogarty's homestead, on what is known as the MacKinnon property, near Iron River. This property was explored some several years ago, and it is said the indications for striking a paying quantity of ore are first rate. A plant of machinery will be placed on the property soon.—[Florence Mining News.

The Night Hawk mine, a new find near the Mastodon, will probably pass into the hands of outside capitalists. Messrs. Dixon, Trevena, and the other option holders have shown up an excellent vein of ore, and ought to experience no trouble in disposing of the property to good advantage.—[Florence Mining News.

Exploratory work will be resumed at the Atlas as soon as adequate machinery can be procured.—[Florence Mining News.

A party of prospectors have began with a diamond drill the work of exploring at Keel Ridge, where it is said that Augus Smith, of Milwaukee, will disburse the sum of $40,000. It is to be hoped that the party will meet with good success.—[Diamond Drill, Crystal Falls.

MARQUETTE RANGE.

At the Winthrop work commenced in the direction of sinking the shaft some distance to the south of the main workings, and which is separated from the latter by a large diorite bluff. There was a shaft put down to a depth of something over 100 feet here last year, but was stopped before the main ore body was encountered. The diamond drill passed through 28 feet of clean ore at this point, and it is to reach this that the shaft is being sunk. The ore here dips to the south while on the opposite side of the bluff, at the present workings, it dips north. Still further south a considerable distance the company has found ore that is of fine Bessemer grade, and which will be wrought in the near future.—[Iron Ore, Ishpeming.

The big new shaft at the Detroit mine is going down at a steady pace and will be to the desired depth in a short time, it having something like 80 feet before the ore is expected. The mine has been one that has fluctuated considerably as regards its ore deposits, and has been disappointing to the company, still it is not improbable that there is a good body of hematite to be encountered, and the present shaft may strike it.—[Iron Ore, Ishpeming.

A considerable degree of activity has prevailed at the Saginaw lately. It will be remembered by older residents of the county that this mine was abandoned as "worked out" some six years ago, and that Lee Peck and the company represented by him have been exploring the property for the last four years, with very satisfactory results. The mine has been unwatered, and mining work has been carried on actively for the past eight months. The mine is now looking well, there is a large amount of ore in sight. A new boiler and compressor plant are being put at the mine, and the management expects to run a dozen or more power drills steadily during the Winter, as soon as the plant is in position to furnish power. This, as all mining men well know, means that the Saginaw will be a shipper of some prominence during the coming year. The work done for the past four years has been largely exploratory, but from now on active mining will be prosecuted.—[Mining Journal.

The Republic Iron Co. completed its shipments of ore via Marquette on the 13th, and the boats are now making their last trip, unless additional shipment is decided upon from Escanaba. The season's product of the mine will not vary much from 230,000 tons.—[Negaunee Iron Herald.

The No. 7 shaft of the Jackson which closed some three or four months ago, is opened to the third level where the work stops until the water can be lowered somewhat. In sinking the shaft which is on an angle of about 45, a winze was sunk and the work opening it in the third level commenced at the bottom, in order to admit of hoisting from the levels above during the progress of the work. While the shaft in this level is intact, the winze was filled by the cave, and the problem of preventing this ground and what it may be holding, from going down the shaft is just now taking the skill of the engineers and miners. At this depth the gain upon the water is very slow and will require from two or three weeks to fork the remaining 50 feet out. The final re-opening of the shaft is only a question of time, but to what extent it may be delayed, of course depends upon the condition of things in and about the winze. Should this be found tolerably secure the work will be finished very soon after the water is out.—[Negaunee Iron Herald.

ATICOKAN RANGE.

Mr. W. W. Russell, of Port Arthur, Can., in the *Lake Superior Review*, of Duluth, has a long report on the Port Arthur iron district, from which the following is taken: During the past Summer the extensive and rich deposits of magnetite on the Aticokan river, about 100 miles west of Port Arthur, have attracted much notice from iron mining men. Some five years ago the first discovery of magnetite was made, and a tract taken up by Messrs. Graham and McKellar. The discovery of the iron in this range did not attract general notice in any way, until the finding, last Fall, of another equally extensive and rich deposit, several miles further west on the same range. The result of this was the starting of numerous exploring parties this Summer, and the discovery of still other outcrops of the same ore further westward, until now these rich deposits have been traced by outcrops for a length of 16 miles along the belt. The McKellar-Graham property is the most easterly on the range, and its most conspicuous outcrops occur on the summit and both faces, of a bluffy ridge running nearly east and west 100 feet above the level of the Aticokan river. Immediately west of the McKellar-Graham property is Sabawe lake, a sheet of water three miles in length. For some distance west of the lake, other outcrops occur very similar to those on the McKellar-Graham property. A little more than half a mile west of this, the ore again outcrops on the south face of a ridge about 50 feet in height, the intervening ground being low; samples from here gave 65 per cent. Half a mile further west, a short trench dug in the low ground showed rich ore at a depth of only three feet; no attempt was made to uncover the width of the deposit, the sole object being to locate it. A mile beyond this, numerous showings are found along the top and south face of a ridge about 100 feet high; the surface showings here are very extensive, and the ore of the same high grade, 66 to 68 per cent. For nearly three miles beyond this, the ground in the line of the deposits is very low, and no attempt to locate the ore by test pits, etc., has been made. As the ore again outcrops and shows at the crossing of the Aticokan river, which is very rapid at this point. Although no development work whatever has been done, the surface showings alone indicate the presence of an enormous amount of leaner iron, which is uniformly free from injurious elements, and of an astonishingly high grade, and I am of the opinion that much of the silicious ore which is now ignored in sampling will, at a depth, become a good, marketable ore.

J. C. Thomas, of the Detroit Iron Mining Co., makes the following report of Aticokan range iron property to his company: The property I examined is known as the Garland, in Rainy river district, on the Aticokan river. I was very much surprised to find such fine outcroppings of iron ore. It was beyond all expectations. The iron range, running about east and west, outcrops at an elevation of 125 to 175 feet and 1,000 to 1,500 feet in length, showing very fine quality of ore. Sample 1 was taken from about half way up and partly across the top of the bluff, a distance of about 135 feet on the ore formation. Sample 2 was taken from ten feet above the surface of the river, a distance of 25 feet across the ore formation. The exact width of the ore can't be given, as there is not enough work done to uncover the ledge. In case these samples should not go as high in iron as may be expected, it ought not to be any setback to the property, as better results would be reached in opening the ore body. These samples were taken from the surface of the ledge. If the property should open as well as I expect, the ore can be mined and put into the cars for 35 to 50 cents per ton at a large output. No definite estimate can be given as to the size of the ore body or to the amount of ore that can be produced until more work is accomplished.—Duluth News.

The Present Uses of Aluminum.

What follows is from a recent letter from the proprietors of the Pittsburgh Reduction Works: At present most of our aluminum is used for fancy articles, to take the place of German silver and plated brass for plaques, match boxes, clock cases and a thousand-and-one articles of a like nature. Some of it is also used as receptacles to hold acidulated waters, the metal being entirely unattacked by either nitric or sulphuric acids. Respecting household ware of aluminum, the Avery Stamping Co. have made up some lines of these goods and have talked about going into it quite extensively. How soon this will be we cannot say. We have to add, however, that at the last meeting of the American Institute of Mining Engineers, at Washington, the use of aluminum for household utensils, in place of tinned, copper and granite ware, was extensively discussed, and the general verdict was that aluminum was by far preferable for this purpose, for, unlike other metals, it is not attacked by acid and contains no poisonous ingredients deleterious to health. In fact, several gentlemen stated the interesting fact that a large percentage of the ills of the human system that were attributed to other causes were due to nothing more than the antimony, arsenical, cuprous and other poisonous salts that go into the food from the vessels used in cooking. We have no doubt that it is only a matter of a short time when aluminum will be very extensively used for cooking purposes.

All Along the Line.

Nickel Plate remarkable rates, Nov. 26th and 27th. Thanksgiving excursions. One fare for round trip. City ticket offices 224 Bank St., 598 Pearl St., and depots.

THE Cleveland *Iron Trade Review* has sent us the iron and steel schedule of the new American tariff law (McKinley Bill), in which the new rates are compared with the old. The pamphlet is in convenient form for reference, and will be exceedingly useful for that purpose.—[Canadian Manufacturer.

THE FUTURE PRODUCTION OF IRON AND STEEL IN THE UNITED STATES.

In his recent address at the New York Meeting of the American Institute of Mining Engineers, Hon. Abram S. Hewitt said:

Until communications by canal or rail had been established between the coal fields and the ore beds, the progress of the iron business was necessarily slow. Its subsequent story is told in the following table, showing the comparative rate of increase in population, and in the production of iron:

Years.	Production of pig iron. Net tons.	Rate of increase. Per cent.	Population.	Rate of increase. Per cent.
1830	184,800	...	12,865,020	32.51
1840	352,900	99	17,069,453	33.32
1850	632,526	80	23,191,876	35.83
1860	919,770	65	31,443,321	35.11
1870	1,865,000	105	38,558,371	22.65
1880	4,295,414	133	50,155,783	30.08
1890	9,579,779	130	64,000,000	28.00

This table brings out the striking conclusion that the production of pig iron has always increased more rapidly than the population, and that the ratio is an increasing one. Between 1830 and 1860 the production of iron increased twice as fast as the population. Between 1860 and 1890 it increased four times as rapidly, thus proving that the national wealth continues to grow from decade to decade at a rate of acceleration of which the world affords no previous example. Inasmuch as during all this time we have imported iron, in addition to our production, it follows that the consumption *per capita* has also increased more rapidly than population. In 1855, according to careful calculations which I made at that time, we were consuming iron at the rate of 117 pounds per head; whereas in 1890 the consumption had increased to rather more than 300 pounds per head, the whole of which, for the first time in our history, we are producing within our own borders.

Great Britain, on the other hand, produces more iron than it consumes, and is still the largest *per capita* producer in the world. In 1889, with a production of 9,234,776 tons of 2,000 pounds and with a population estimated at at 38,000,000, the production reached the large figure of 495 pounds per head. Deducting the exports, Great Britain is now consuming 250 pounds per head, against a consumption of 144 pounds in 1855. But the production of iron in Great Britain appears to be now nearly stationary, as will appear from the following table, giving the quantity produced since 1880:

Years.	Gross tons.	Years.	Gross tons.
1880	7,749,233	1885	7,415,469
1881	8,144,449	1886	7,009,754
1882	8,586,689	1887	7,559,518
1883	8,529,300	1888	7,998,969
1884	7,811,727	1889	8,245,336

This table discloses the fact that in 1889 Great Britain, while making an increase over 1888, was not able to reach the product of the years 1882 or 1883. It may, therefore, be concluded that no considerable increase of production is to be expected, especially in view of the facts that the present production is only maintained by the importation of foreign iron ores to the extent of 20 4 per cent. of the total ore consumption, and that the ratio of foreign ore consumed in Great Britain is a steadily increasing one.

In the United States the case is otherwise. We have been able to increase our total product year by year without increasing the importation of foreign ores, none of which are, in fact, necessary to the existence and growth of the business, although in some localities, near the coast, foreign ores are desirable for the production of Bessemer pig iron. Assuming, then, that the production of Great Britain is not likely to be increased and that the growth in the consumption of iron is to go on with the increase of population and the progress of industry in the future as in the past, we are in a position to estimate the demands which will be made upon the resources of the United States for the next ten years. The population in 1900, allowing the same rate of increase of 28 per cent. as in the last decade, will be 82,000,000. A consumption of 300 pounds per head will require 24,600,000,000 pounds of iron equal to 12,300,000 tons of 2,000 pounds. If, in accordance with the accelerated ratio of consumption, which has trebled since 1855, the *per capita* demands shall rise to 400 pounds, the total tonnage required will be 16,400,000 tons of 2,000 pounds, equivalent to 14,640,000 gross tons. The consumption of the world in 1889 is estimated at 24,869,534 gross tons, of which we produced 30 per cent. and Great Britain 33 per cent. The consumption of the world has increased in eleven years from 14,117,902 tons to 24,869,534 tons, or nearly 11,000,000 tons. Assuming that the coming ten years will require an equal increase (and it is likely to require more) the United States must supply 7,000,000 tons and the rest of the world 3,000,000 tons in order that the two continents may not be forced to draw supplies from each other. I think it is safe to estimate, therefore, that in 1900 the world will require 35,000,000 gross tons of iron, of which the United States must supply 45 per cent. and the other iron-producing countries the remainder, in the proportion of half to Great Britain and half to Germany, France, Belgium, and the other smaller producers.

The question presents itself whether this vast demand can be met without such an increase in price as will tend to restrict the use of iron within narrower limits. The increased call upon the European countries is too small to make any embarrassment, except such as may arise from the fuel and food questions, both of which are serious problems in the industrial world. The answer to the question must, therefore, come from the United States; and in view of the two continents in regard to the supply of iron it will be seen that tariff legislation will henceforth play no part in the solution of the problem. According to the traditions of the Institute of Mining Engineers it is not permissible to discuss commercial questions; but there is no impropriety in calling attention to the fact that one of the perplexing elements in the consideration of the future of the iron business is removed from the problem when the conclusion is reached that henceforth it will task the ability of Europe to supply its own demand for crude iron, and the United States must look to its own resources for the supply of the great demands of the coming century.

So far as we are concerned, then, the question is substantially whether this country can nearly double its production in the next ten years without so seriously increasing the present cost of iron as to restrict the consumption and arrest the rate of progress at which the world is now moving forward.

Wrought Iron Ornaments.

The adaptability of wrought iron for receiving the most delicate forms of artistic fashioning renders it particularly applicable to various articles of household use, as well as for interior decoration. It admits of every intricacy of form suitable to the designers' purpose, separate parts being welded or riveted. This ornamental application of iron has not been so extensive in this country as its decorative capacities justify, but there is a growing liking for the special characteristics of this metal when worked in artistic forms. Such productions are enhanced in effect by the rediscovery of the means of imparting to the surface a dead black hue, dispensing with the aid of pigments and resistance of oxidation. This hue appears in all the early wrought iron work. Designs, too, may be heightened in effect by combination with copper, blue steel, and also by enameling of accessory ornaments. The leading features in all the forms is the scroll, whether in concentric lines or spirals, graceful in themselves, and pleasingly suggestive of the contrast between present rigidity and past malleability. As beaten out by the hammer and welded at the forge, artistic articles cannot fail as reminders of the subtle skill brought to bear on their execution. Ponderousness and weight are common associations with iron, but its inherent strength admits of the employment of a minimum of material in securing substantial and serviceable articles. For what can be realized in this metal in the way of elegance and refinement of form, we may refer to the productions of all periods in the art—the Italian Renaissance, when skilled in manipulation attained an excellence since unapproached, not only in grilles, railings of shrines and altars, canopies for the adornment of churches, but in domestic articles embodying often the most delicate forms of ornament, mostly heightened in effect by quaint devices displaying the freedom and ease with which the caprices of fancy might be embodied. The master smiths of that day were emphatically artist workmen, executing the designs committed to them in the spirit in which they had been conceived and encountering technical difficulties, as these presented themselves, only to overcome them in securing the intended effects. There was life, vigor and individuality in their work. Their interlacings and leafage and flowers were marvels of skill, and their designs are still accepted in the way of suggestiveness for modern work, for modern art has its own ambition in this line, and is achieving manifold successes. Current productions for the house comprise such articles as electroliers, electric brackets, mirrors, bells, sconces, vases, easels, flower stands and fine ornaments.—[Decorator and Furnisher.

Wire Nails from Steel Plate.

An ingenious and progressive Pittsburgh iron and nail manufacturing concern has fitted up an attachment to its steel plate nail mill, by which it is claimed wire nails can easily be made. Hitherto this has been regarded as impossible, but a reporter, last week, witnessed the operation of the new device, and was enlightened as to the process, and thus describes it: One of the long row of nail plate machines, out of scores now standing idle, has been fitted with the new arrangement. The self-feeder has been removed, and in its place is substituted an ordinary wire nail machine feed, operating from the left side. The bed plate, gripping and heading dies remain as in the old machine, but from the clamp at the back is attached an arrangement for cutting and pointing the wire, similar to the manner in which this process is done in regular wire nail machines.

It is said the adapted machine turns out perfectly formed nails at the rate of 250 a minute; that the heading die performs its work better than that of the regular wire nail machine. The heading arrangement of the latter works from above, and fashions the heads with a quick blow. The heading die of the transformed nail plate machine works from the right hand side, and works the heads with a more gradual motion. The nails are seemingly thoroughly well made, well pointed, and with large head, and without any indication of splitting. By changing the space block, 4, 6, 8 and 10-penny sizes can be made. The alteration of the plate nail machine to the wire nail producing form is quite simple, and can be done in 30 minutes, and its capacity for wire nails is said to be from 40 to 50 per cent. greater than the ordinary wire nail machine. —[Western Manufacturer.

The Rolland Fireless Locomotive for Mines.

M. C. Rolland, in Mons, Belgium, has constructed a fireless locomotive for use in mines. It is provided with a tank that holds 0.550 cubic meters. The water is heated to 205 degrees C. (or an absolute tension of 16 atmospheres) by a boiler placed on the surface; it is sufficient for a steady run of 3 to 4 kilometers. The heating is brought about by means of steam jets, as first proposed by Mr. Bede, Belgium. The heat thus stored up in the rather small space, gradually evaporates the water required to run the machinery. At a speed of 2 meters per second, the locomotive works with 6 h. p., that of a horse being generally estimated at from 0.6 to 1.0 m., so that the locomotive working [illegible] uninterruptedly, takes the place of from 12 to 18 horses, [illegible] many laborers. The saving is calculated to be $200 per horse dispensed with. As a further advantage, this locomotive secures better ventilation. The weight of the locomotive is 3,000 kg.

Thanksgiving Excursions.

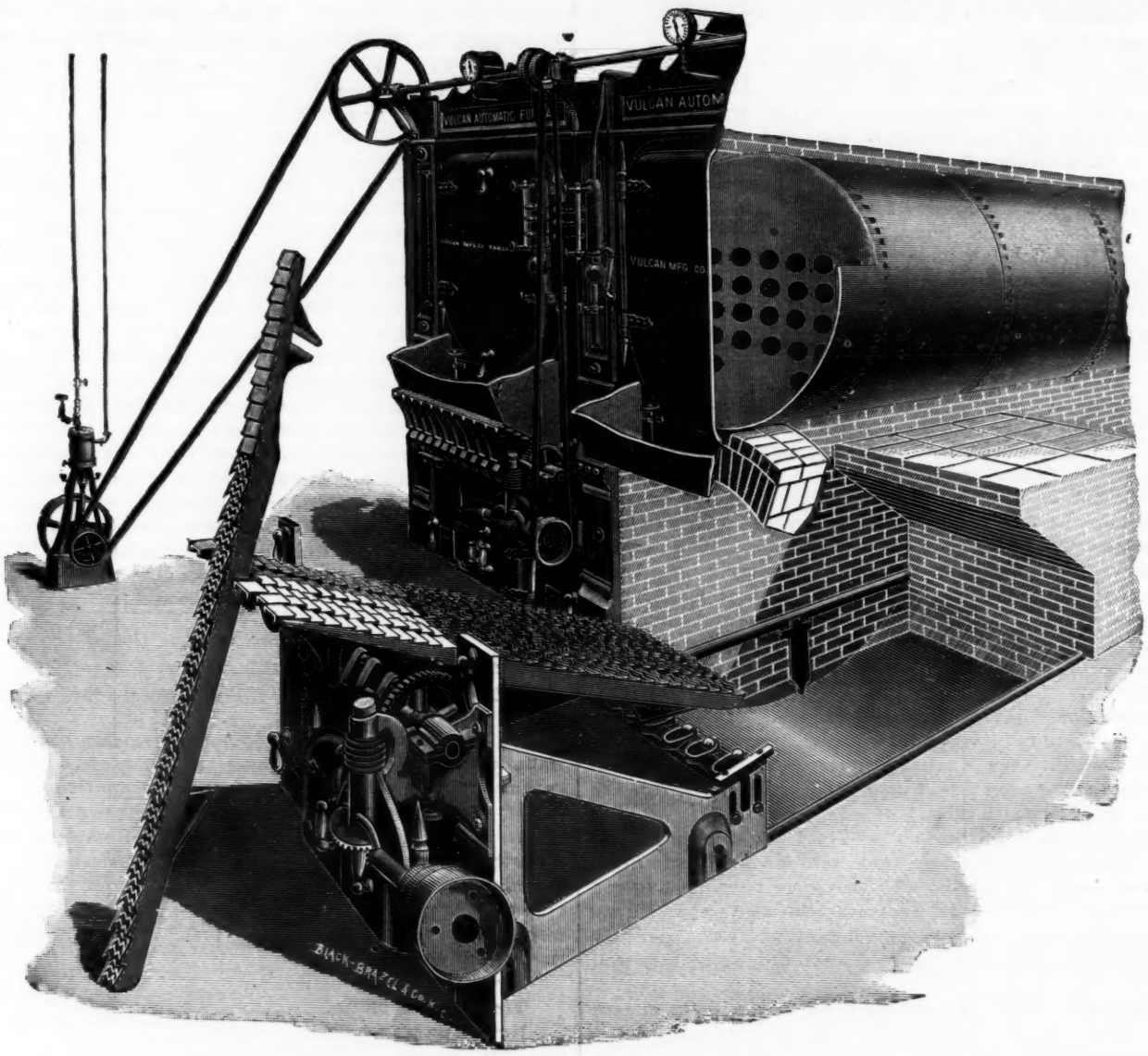
Nickel Plate, Nov. 26th and 27th. One fare for round trip. Returning Dec. 1st., 1890. City ticket offices 224 Bank St., 598 Pearl St., and depots.

THE VULCAN SMOKE-PREVENTING AUTOMATIC FURNACE.

One of the most progressive movements in recent boiler-room practice is in the direction of automatic stokers, by means of which the fuel is mechanically and continuously fed to the furnace by means of automatic mechanism. This is as it should be. The draft for steam upon the boilers is a continuous one, and the process of making steam to meet it should also be continuous and uniform. The furnace should be kept as nearly as possible in a uniform condition, and not fluctuate between the comparative coolness of a heavy charge of fresh fuel and the white heat of that fuel in a state of intense combustion.

In the engraving the front of one boiler is shown intact with the automatic feeding device attached, while the furnace in front is shown in section and with the mechanism drawn out so as to make the construction and arrangement apparent. The hopper extending across the front is equal in width to the furnace, and is a receptacle for the fuel, which can be either shoveled into the hopper in the usual way for small plants or supplied by gravity from an elevated bin, as is more generally adopted in large plants. The bottom of the hopper is formed by the protruding ends of the grate bars, which extend beyond the front of the boiler and are formed in steps so that, as they are moved slowly backward and forward, the fuel is conveyed to the furnace below. An adjustable plate is secured in the hopper above the grate bars for regulating and controlling the movement of the fuel.

A question will immediately arise in the mind of the practical engineer as to what he should do with such an arrangement in case of danger or an accident which should require the immediate withdrawal or banking of the fire. This has been provided for in this furnace by mounting the frame which carries the bars and other mechanism upon wheels, resting on tracks, which enables the whole construction to be withdrawn from under the boiler, as shown in the engraving. The grate bars used are of the Vulcan patent type, consisting of a series of zigzags supported between two thin ribs. Each of these zigzags forms a step about one-quarter of an inch lower than the preceding step. The construction of this grate admits of the utilization of from 65 to 75 per cent. of the grate surface as air space, through which air enough can be admitted to secure the thorough combustion of the fuel and the prevention of smoke, without the introduction of cold air above the grates. The bars are placed on an incline of from 20 to 25 degrees from a horizontal line, according to the fuel used, and rest on anti-friction ball bearings, each bar being provided with sockets at both ends to receive the balls. Each bar is provided with a U-shaped bearing at its outer end, as clearly shown in the enlarged bar represented as leaning against the grate. These bearings, set upon cranks, as shown, which, when in motion, communicate a reciprocating motion to the bars. Thus one-half the bars are going forward and upward, while each alternate bar is coming backward and forward. This movement is extremely slow, and the fire is thus worked gradually toward the bridge wall. As the fuel is carried forward by one-half the bars, each alternate bar is going back and down out of the fire, freeing itself from clinkers, and, by its withdrawal, forming an opening at the lower end, through which the spent material and clinkers find their way to the ash pit. This positive feed, depending upon the movement of the bars and not upon the gravity of the fuel, renders it possible to maintain a steady, even fire with a comparatively slight inclination, allowing the fire to be brought nearer to the boiler and requiring less vertical space for setting. As a proof of the positiveness of the automatic feed, one of these furnaces was run continuously for eight days and eight nights without touching the fire with a poker in all that time, the coal traveling without any stoppage whatever, at a rate dependent only upon the speed of the engine and the adjustment of the sliding door, through which the coal was admitted from the hopper. The motion being extremely slow, and the bars resting upon anti-friction bearings, very little power is required to operate the mechanism, and this may be furnished by a small engine, an electric or water motor, or from one of the regular line shafts. The Vulcan Manufacturing Co., Kansas City, Mo., are the sole manufacturers.



THE VULCAN SMOKE-PREVENTING AUTOMATIC FURNACE.

The Proposed Channel Bridge.

It will be remembered that the company formed to carry out the preliminary surveys connected with the scheme for constructing a bridge across the Channel decided, after negotiations with the Commission charged by the French Minister of Public Works with the examination of the demand for a concession, to undertake soundings in the Straits of Dover, in order to ascertain the exact depth and the nature of the soil of the proposed site, and also whether another route might not prove more advantageous. The soundings were taken during the months of July and August in French waters from the steamer *Ajax*, under the direction of Messrs. Renaud and Georges Hersent, the former, who is a hydrographic engineer, being designated for the work by the Minister of Marine. In British waters the operation was carried out by the steamer *Jubilee*, belonging to the South Eastern Railway Co., and lent to the Bridge Co. by Sir Edward Watkin, who also placed the papers relating to the tunnel soundings at the company's disposal. The result of the surveys made shows that the route is a little shorter than was expected, that it presents every guarantee as regards solidity and stability, and that its depths are not quite so great as were expected. M. Renaud's examination has further shown that in going a little further north a perfectly straight route can be obtained, with a better foundation and less depth of water. This route would be four kilometers shorter, and would therefore considerably decrease the cost of construction. It also appears to be less exposed to the wind, which would prove a great advantage, especially during the progress of the work.—[Iron and Coal Trades Review, London.

UPWARDS of 15,000 tons of iron and steel are being used in the construction of the Tower Bridge over the Thames.

AN ENGLISHMAN'S IMPRESSIONS OF AMERICAN IRON WORKS.

The opinions of our recent English visitors upon the iron and steel interests of the United States are very interesting. Here is a sample:

In the course of an interview with a Press representative, Mr. George Siddell, of Roewood, Pitsmoor, Sheffield, who returned home a few days ago, said he had been much impressed with America, the abundance of its resources, the rapidity of its industrial development, the business activity and enterprise of its people, and their untiring industry and application. Like others who have gone there, he has been struck with its "greatness," which, he says, is equally as characteristic of its manufactures as of its wide dominion and its physical features.

"Everything in America," said Mr. Siddell, "is on a very extensine scale, except two things—great guns and great ships. But they will have them yet. If it is a fact that the Government have bought up the nickle mines, it means that they are going to make armor-plates on a very different scale from anything they have attempted. In the American manufactories there is no consideration of expenditure as to plant and machinery, and labor-saving appliances are taken advantage of to such an extent that in the iron and steel works, and especially the rail and plate mills, manual labor is cut down to a mere cipher. Of course, this is done as far as possible in England—at Bolkow and Vaughan's, the Barrow Hematite Steel Works, and other places—but it seemed to me that it was specially remarkable in the American works I visited. I did not go into the great rail mill at Chicago which is said to be superior to any similar concern in the whole of the States, but I am speaking generally of the manufacture of rails and ship-plates."

"Is the output greater than at the English works?"—"Well, there are some large undertakings, but we have as large in England. The Consett Iron Co., I believe, turn out about four times as much as the largest American works. At Carnegie's I was told that the output is about 4,000 tons a month, but the Consett Iron Co. produce something like that quantity every week. Carnegie's place is magnificent. The arrangement of the melting furnaces, both there and at some of the other places I went to, is splendid. There is nothing in England can touch them. Some of the melting furnaces have a capacity of 35 tons, and I don't think there are any in England greater than 30 tons. They have many circular furnaces, too, which I have not seen in England, but I do not know that there is any great advantage in that mode of construction. At Chicago I believe they roll direct from the ingot, without reheating, which is also done in some of our works, but at the Carnegie's they roll from the bloom, which I consider is much the safer plan."

Asked further as to the comparative capabilities of local and American works, Mr. Siddell continued:—"I think the American rail mills beat us, but there is nothing very wonderful done in America in the shape of large forgings. I don't think they do anything beyond 10 tons, and we can run up to any weight that there is a call for. But we had not the opportunity of going over the Bethlehem Works, where the Government orders are executed for gun forgings and so forth. Messrs. Whitworth have recently sent them out a forging press, and it was thought this had something to do with our exclusion. There is a splendid opportunity," Mr. Siddell added, "for the energetic Englishmen to go out there in the heavy trade. They might make a fortune in a very short time, because there is no heavy work done there yet. They are just commencing with the guns, and any one well up in gun forging could command his own price."

"What is your impression," asked our representative, "of the American working men?"—"They seem to be very hard working," replied Mr. Siddell. "They do a deal more work than the Englishmen for their money. A good many of the mills are run at a greater speed than the English mills, and the men must be quick to keep pace with them."

"Are they steadier than the Englishmen?"—"Yes, I think, perhaps, they are more temperate. There is no drink, you know, sold on Sundays in Pittsburgh and many other places. Many men who have gone out from England have done exceedingly well. I saw two old workmen, who used to be with me at Vickers' years ago, and one of them got a good position as manager of a works, and is able to keep his carriage and pair. The other is doing very well too."

"You think that men with ability and perseverance have a better chance than in England?"—"Yes. I think it is better for the working men. But a man must work if he wants to live out there. I think, too, it is easier for a man to make a start for himself if he has a little capital. But in the heavy trades a good deal of capital, of course, is required, as there must be a large outlay for plant, and you must be able to hold your own for a few years. The cost of plant is great. Mr. Samson Fox has a place in Chicago, and the duty they charged him on his hydraulic press, which he sent out from England, was enormous. But for the tariff," Mr. Siddell said later on, "the American manufacturers would be able to compete with the English, for there is very little labor used, as I said before."

"You are speaking of the effect of the tariff on the cost of the raw material?"—"Yes, the machinery is splendid. There is nothing like it in England. They seem to spend all their profits on extension."

"What did you find to be the feeling in respect to the McKinley Act?"—"Oh, they are all eager for it, especially the manufacturing towns. The working men are all in favor of it, as keeping the work at home."

Mr. Siddell was greatly impressed with the evidence which was afforded of the immense natural resources of the United States. "At one place," he says, "they were shown a complete mountain of iron ore. It had been bored for 300 feet down, and they have still not got through the magnetic ore, and one of the members of the Institute had a piece of silver got out from the bed of Lake Superior." He describes the sights afforded at the oil wells and the natural gas bores as very grand and striking, especially the natural gas illuminations. Nearly all the works at Pittsburgh use the natural gas as a fuel, but the supply shows signs of giving out. The pressure has already diminished to one-tenth of what it formerly was, and he saw a statement in one of the newspaper that natural gas in certain districts was being refused to manufacturers. Should the supply give out, this will deprive American manufacturers of one of the advantages they at present possess. Mr. Siddell did not go the Southern trip, but gathers the impression that, from the superior natural resources in their neighborhood, Cleveland and Birmingham are likely to outrun Pittsburgh as centres of the iron and steel industry.

Talking over his impressions of different cities that he visited, Mr. Siddell specially remarked: "The greater use which is made of electricity in the States, not only for street and domestic lighting, but as a motor for street cars, which are propelled at a much higher rate of speed than English tram-cars, and travel round curves at such a radius as to try the nerves of an Englishman. A road as steep as Derbyshire lane was mounted in Allegheny City at twelve miles an hour, and the cars are allowed to run at twenty-two miles an hour on the level." The facilities for locomotion in the great cities are, Mr. Siddell considers, one of their most remarkable characteristics.

Finally, replying to a query as to the advantages gained by the visit, Mr. Siddell said: "In addition to the pleasure and interest of the excursions, the members of the Institute had doubtless gained a large amount of valuable information as to the material resources of America, and the future possibilities they involved, but he did not think that the engineers had gained very much from a mechanical point of view, although, with a few exceptions, at the works visited a communicative disposition was manifested by those by whom they were received."

Buckling of Plates.

A paper on the buckling of plates was read by Mr. G. Bryan, of Cambridge, at Leeds. In it he described the working out of the analogues for a plane plate of the well-known conditions of stability of a straight elastic wire under axial force. The first case considered was that of a rectangular plate, supported but not clamped round its boundary, and acted on by different uniform edge thrusts in its plane applied perpendicularly to the sides and ends. The conditions of stability are found, and the most interesting point which they lead to is the determination of the number of corrugations produced when buckling takes place. If the thrust per unit length on the sides be less than half that on the ends, the plate will buckle into a series of undulations, whose number will depend on the ratio of the length to the breadth of the plate. In the case of an infinitely long strip the corrugations will divide the strip into rectangles which will diminish in length as the lateral thrust is diminished, will become squares when there is no end thrust only, and will become closer and narrower when the lateral force changes sign and becomes a tension. This effect may be easily illustrated by wetting the middle of a sheet of thin paper, which is then stretched over two rulers. If, then, the rulers be pulled apart with increasing force, the wrinkles will become more numerous and finer. The undulatory character of the buckling is also analogous to the collapse into rings of a boiler flue. The paper also contained an account of an investigation of the stability of a circular plate clamped round the edges and acted on by uniform normal edge thrusts in its plane. This kind of buckling, he explained, was well illustrated in the circular lid of a canister whose rim is in a state of tension.

Look to Your Boilers.

The following timely warning is from the columns of the *Journal of Railway Appliances*, the leading journal in the mechanical department of the railway trades:

Look to your boilers. We do not, saying this, refer to locomotive boilers. Happily, the makers of these have not been forced into the current of price cutting which has swept the balance of the boiler-making trade down to the sea of demoralization. A recent inquiry revealed the fact that though some few are still making first-class boilers out of material adequately strong, the majority are turning out boilers of the flimsiest construction, being poor material put together by bunglers. Tank iron, for the first time, is being openly made into boilers, "to fit the low prices ruling." That's what a boiler maker declared recently, adding that "if only enough water were kept in them they were safe enough."

Never buy a cheap boiler.

That's a good motto.

Never buy from a cheap maker.

That's another good one.

By this we do not mean that a purchaser should not seek to get the most for his money, but only that he should avoid those known to be turning out poor material. To buy a cheap boiler and "take the chances" is to "monkey" with a bombshell.

Buy a good boiler and employ a first-class engineer to run it.

A CRACK in a piece of metal is prevented from extending further by the well-known means of drilling a hole where the rent ends; but when the hole is not bored on just that spot, the crack is apt to continue beyond the hole To facilitate the search of the exact point, *Revue Industrielle* recommends moistening the cracked surface with petroleum, then wipe it and then immediately rub it with chalk. The oil that has penetrated into the crack exudes, and thus indicates with precision where the crack stops.

THE steam engines of the world represent, approximately, the working power of 1,000,000,000 of men, or more than double the working population of the world, the total population of which is usually estimated at 1,455 923 000 inhabitants. Steam has accordingly enabled man to treble his working power.

THE iron and steel schedule of the New Tariff Law, with a comparison of the new and old rates of duty, has been issued in a neat pamphlet, and is being distributed with the compliments of *The Iron Trade Review*, of Cleveland, O.—[Hardware, New York.

THE METAL INDUSTRIES OF FLORENCE.

Another of Sir Dominic Colnaghi's interesting reports on North Italian matters has lately been issued by the Foreign Office. It deals with the metal industries of the province of Florence, which in 1881 gave employment to 5,662 persons only, the province being more argricultural than industrial. The Tuscan wrought iron (*ferro al maglio*), once so much appreciated, is now only in demand for agricultural implements. Special attention is paid to the manufacture of oil and wine presses, and recent exhibitions have shown that this branch of industry is making great strides. The majority of the establishments in the province of Florence are small; they give employment only to a few hands, and are of local rather than of general importance. The pig iron required in the foundries comes from Great Britain and from Follonica. The iron used is Italian, Belgian, German, English and French; the steel comes from Austria, Germany and Sweden, and occasionally from England. The machinery and machine tools, engines, etc., are chiefly German, French, or Swiss, though Italian engines are now to be met with in some works. The use of British machine tools is declining on account of their high price as compared with those of German manufacture. Agricultural machines, however, still hold their position. The daily hours of labor in the principal factories are usually 10 net, though in some cases they may be 11. Work is not, as a rule, carried on on Sundays. At present the province has six iron works in which bar iron axles for vehicles and agricultural implements are produced. In 1880 the total annual production was estimated at 6,115 tons. The most important of these works, those of Mammiano, in the district of San Marcello (Pistoja Mountains), are shortly to be closed, so that this production will be considerably reduced. The foundries and mechanical workshops produce articles of great variety, such as tubing for gas and water, lamp-posts, railings, gates and other decorative articles, conservatories, bridges, roofings, milling, pumping and agricultural machines, oil and wine presses, agricultural implements, etc. In wrought iron some of the decorative articles display considerable skill. The bronze castings of statues are also successfully carried out. The Consul-General then notices in detail a few of the leading establishment of the province, and, as to the Tuscan workman, observes that, though he is not so well drilled as the British artisan, his wages, though rising, are still low, and he has an artistic instinct inherited from his mediæval or, perhaps, even his Etruscan ancestors.—[Iron and Coal Trades Journal.

An Electrical Furnace.

It is by no means impossible that electricity may ere long be applied to smelting furnaces, says the *Colliery Engineer*. In an electrical furnace recently patented in England, instead of using movable electrodes of metal or carbon, the inventor uses block cylinders of carbon secured in metal cases and placed opposite each other in the walls of the furnace. The metal cases containing the carbon are kept cool by a circulation of water in them. These block cylinders or electrodes are fixed while the furnace is running, only needing to be pushed farther into the furnace to compensate for wear. Rods of metal or of carbon are used to establish the electric circuit through holes in the furnace. In starting the furnace when charged and required to be run, these rods are pushed through the holes in the furnace until those of one side meet those of the other, and through these rods a current of electricity is passed which creates a high state of incandescence, and thereby establishes a passage for the current in the material in the furnace. Means are provided in the furnace for the escape of gas and for the introduction of the charge, and also for varying the electro-motive force of the current across the furnace according to the varying resistance of the charge.

Iron for India.

The Indian technical journals are loudly complaining of the inferior quality of a large part of the iron shipped to India from Europe. A writer in the *Pioneer* alludes to the rubbish that one finds in the Indian market under the name of wrought iron. Nothing shows more clearly how materials are made to "sell," without any regard to their intrinsic quality, than the badness of some of the iron sold in India. Hot-short, cold-short, laminated all over, incapable of being worked at a moderate temperature, and burning at a high one, some of the bars that may be seen in this country are literally only fit to be buried, notwithstanding they bear excellent brands, and are cut to resemble Swedish, or any variety the purchaser likes. We are not cognizant of the source of this supply of rubbish, but we have good reasons to believe that the bars of "funereal" quality were not manufactured in this country, and that "made in Belgium" would be the correct stamp for these bars, if the provisions of the Merchandise Marks Act were strictly carried out. It is not so long ago when the same cry was raised in China, and it was afterwards discovered that Belgian bars and rods of the most inferior quality were being shipped and sold in the Chinese market as best Staffordshire iron —[Iron and Steel Trades Journal, London.

The First Electrical Road in England.

According to a London dispatch the first English electrical railway was opened November 3. The road runs underground from the monument commemorating the great London fire, under the river Thames, and terminates in South London. The ceremony of opening the road was conducted by the Prince of Wales. The cars and tunnel are lighted by electricity. No tickets are sold, entrance being had through a turnstile. If it shall be demonstrated that the road is successful, electricity will probably be introduced on the old underground railroad.

One Fare

For round trip via Nickel Plate, Nov. 26th and 27th. Thanksgiving excursions between all stations. City ticket offices 224 Bank St., 598 Pearl St., and depots.

INDUSTRIAL SUMMARY.

New Enterprises:—

Ground has been broken for new malleable iron works at Toledo, O.

The Tiffany Iron Works, at Tecumseh, Mich, has been incorporated with a capital of $50,000.

Smith & Burdette, of Cincinnati, O., are reported as to establish branch pipe works in Bristol, Tenn.

The Rigby Safety Car Wheel Co. is a new organization at Detroit, Mich., with a capital stock of $500,000.

At St. Joseph, Mo., the St. Joseph Bridge & Boiler Works have been incorporated, with a capital stock of $42,000.

The Chicago Machine Works, an establishment which will employ 500 men when completed, will be erected in Sioux Falls, Dak.

The Utah Mining & Irrigating Pump Manufacturing Co., with a capital stock of $150,000, have been incorporated at Salt Lake City, Utah.

The Attalla Foundry & Manufacturing Co. has been organized and will erect a $10,000 chair factory and a $25,000 foundry and machine shop at Attalla Ala.

Frank Tyman, E. M. Nettleton, W. A. Rinehardt and others, have secured a site at Covington, Va., and will erect a foundry and machine shop, and a steam tannery.

A rumor is current to the effect that Edwin Norton, of Chicago, Ill., and others will utilize as a tin can and pressed tinware factory the Abbot rolling mills at Canton, Md.

H. Fisher, W. A. Wilmot and J. H. Callahan, of Chicago, Ill., have incorporated the Frog & Railway Co., for the manufacture of railway appliances; capital stock, $500,000.

The Edward Best Car Axle Box & Lubricator Co., of Ottawa, Can., has been incorporated, with a capital stock of $25,000, and will manufacture car axle boxes and lubricators.

The Ajax Rustless Torpedo-proof Pile Armor Co., has been incorporated at San Francisco, Cal.: capital stock, $1,000,000; incorporators, D. S. Dorn, R. J. Davis, R. H. McDonald.

The Monitor Steam Generator & Manufacturing Co. has been incorporated at Roanoke, Va., with a capital stock of $250,000. The company will manufacture steam generators.

The Folding Sewing Machine Co. has been incorporated at Springfield, Ill., with a capital stock of $50,000. The incorporators are Marion O. Smith, Frank S. Smith and A. C. Smith.

At Covington, Ky., E. S. Read, W. W. Hill, F. N. Read and others have incorporated the Eureka Safe & Lock Co., for the manufacture of safes and locks. The capital stock is $50,000.

The Supply Manufacturing Co., of Pittsburgh, Pa., has been chartered, with a capital of $50,000. The directors are Wm. J. Hammond, Robt. A. Hammond, James H. Hammond and Wm. E. Justin.

The National Railway & Street Rolling Stock Co., of Boston, Mass., will, it is said, build car shops at Galveston, Tex., provided the citizens subscribe for $100,000 of the stock in a $500,000 company.

J. M. Love, Epes Randolph and H. P. Whitaker have incorporated, at Covington, Ky., the J. M. Love Pin & Link Holder Co., to manufacture a pin and link holder for railroad cars. The capital stock is $300,000.

The Virginia Stove & Range Co., Wytheville, Va., is preparing for the erection of extensive works. The building will be 195x160 feet and three stories high. The works are to be in operation in three months.

A license of incorporation has been granted to the Smith & Cade Co., Chicago, Ill., to manufacture corrugated iron and sheet metal work; capital stock, $30,000; incorporators, John Smith, S. T. Cade and J. H. Perkinson.

A corporation to be known as the Haywood Foundry Co. has been organized at Portland, Me. The company has a capital stock of $150,000; its officers are: President, Earl A. Thissel, of Florence, Mass.; Treasurer, H. Warner, of Florence, Mass.

The L. L. Culver Manufacturing Co. are establishing a factory at Twentieth and Morgan streets, St. Louis, Mo., for the manufacture of Mr. Culver's new hot water heater. At first 75 to 100 men will be employed. Mr. O. B. Fuller will be heating engineer of the concern; he was for many years with the Detroit Heating & Lighting Co., and has ripe experience in his profession.—[Age of Steel.

A company has been organized at Pittsburgh, Pa., to manufacture large meters for the measurement of natural gas. George W. Simonds is at the head of the company, and associated with him are John F. Scott, Oliver C. Pudan, Charles B. McLean and Thomas Woods. The machine shops of Sterrit & Thomas, in Pittsburgh, have been purchased, and the meter, which is the invention of Mr. Pudan, will be manufactured in these shops.

Enlargements, Additions, Removals, Etc.:—

The Moline Plow Co., at Moline, Ill., is putting up a large addition.

The Nashua Iron & Brass Foundry, at Nashua, N. H., is increasing capacity.

The Emerson Machine Co., of Granby, Conn., are to double their capacity.

Liddell & Co. are about to build a large machine shop and foundry at Charlotte, S. C.

The Batesville Iron Works, Batesville, Ala., will add a foundry to its machine shops.

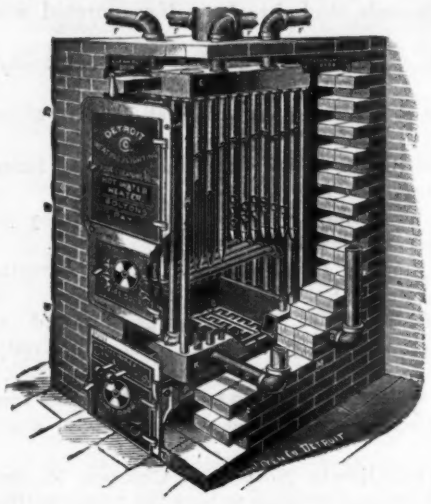
The Moffat Manufacturing Co., of Chester, S. C., is adding an iron foundry to its implement factory.

The Mossy Creek Foundry & Machine Co., Mossy Creek, Tenn., will put in additional machinery.

It is reported that the Union Pacific Railway Co. will erect machine shops at Fort Worth, Tex., to cost $1,000,000.

The Sandy Hill (N. Y.) Iron & Brass Works have the foundations laid, and

BOLTON



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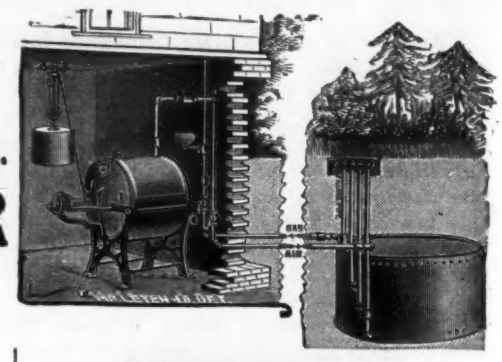

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Over 20 Years in use, with never an Accident.

Average cost of gas, ½ cent per hour per burner.

have commenced on the brick work of their new building, which will be 50x160 feet.

It is said that Messrs. Cartwright, McCurdy & Co. are to construct, at a cost of $50,000, a puddle mill adjacent to their Enterprise Iron Works plant, Youngstown, O.

The Elliot Frog & Switch Co., East St. Louis, Ill., has purchased two blocks of land in the Aimes tract, on which, it is said, they will erect new and extensive works next Spring.

Westinghouse, Church, Kerr & Co., Chicago, Ill., have purchased the old Cragin plant in the northwestern part of the city, will refit the factories, and employ about 100 men in the manufacture of engines.

The Atkinson Car Spring Works, of Chicago, are building a plant near Harvey, Ill., for the manufacture of steel for their car springs. They are putting in a 12-ton open-hearth steel furnace, and a 12-inch train of rolls.

The Wheel & Seeder Manufacturing Co., manufacturers of agricultural implements, formerly of Fond du Lac, Wis., have removed their plant during the past Summer to La Crosse, Wis., where they have built new works.

The Whitman Agricultural Implement Works, at Auburn, Me., are making extensive improvements and alterations. The machine and forge shop is to be raised, and a story built underneath it. A new mill, 100x22 feet, will also be erected, and a lot of new machinery placed in position.

The G. A. Gray Co., Cincinnati, O., has purchased land on the Lake Shore railroad, at Cleveland, and will build shops in the Spring. The moving is in part due to the fact that the business of the company has outgrown the present capacity. The company will build a foundry as well as machine shop, so as to make its own castings.

The promoters of the Barberton boom have made another important deal by which an old and well-known manufacturing concern—one of the largest of its kind in Northern Ohio—will be located at Barberton. The concern is the Cleveland Steam Derrick Co., Cleveland, O,, and, as it is understood that final arrangements for the removal of the company's plant from Cleveland to Barberton have been completed, it will probably not be long before the company's works are located at Barberton. The company, as its name implies, manufactures steam derricks and other heavy machinery, has a large capital, and employs about 400 men. It will prove to be a valuable addition to the list of important manufacturing establishments already located at Barberton.—[Akron (O.) Beacon.

Furnaces and Works Starting Up:—

The Newberry Furnace, at Newberry, Mich., was blown in on October 20, after being out of blast thirty days for repairs.

No. 1 furnace of the Carrie Furnace Co., Pittsburgh, Pa., was put in blast on the 30th, after relining. New stoves were also added.

No. 1 stack of the Woodstock Iron Co., Anniston, Ala., has gone into blast after an idleness of several months, during which extensive repairs were made and a large stock of charcoal laid in.

Fires and Accidents:—

The Appalachiola Iron Works, at Appalachiola, Fla., were destroyed by fire, October 28.

The machine shops of William Kesselman & Co., at Butler, Pa., were recently destroyed by fire at a loss of $10,000.

A fire recently occurred in the rolling mill of the New Albany (Ind.) Steam Forge & Rolling Mill Co., by which the building was damaged to the extent of $5,000.

The elevator shaft at the Clinton Iron & Steel Co.'s blast furnace, at Pittsburgh, was partially destroyed by fire November 9, enforcing a temporary shutting down of the furnace.

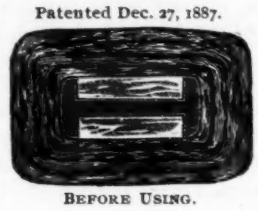
The Isabella Furnace Co.'s new blast furnace, No. 3, was lighted on the 13th. The furnace is 75x16 feet, and is supplied with a new design of stove, patented by the superintendent, Mr. Hugh Kennedy.

General Industrial Notes:—

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 29th day of November, 1890, for all the labor and materials and fixing in place complete, the low-pressure, steam heating and ventilating apparatus for the United States Post Office, etc., building at Houston, Tex.

It is not a Dead, but a Live Elastic Packing.

Patented Dec. 27, 1887.



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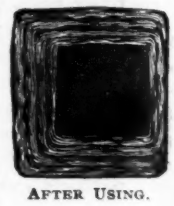
That will pack a Steam, Water, Oil, Air or Ammonia Rod, also a Smooth, Fluted, Out-of-Round or Vibrating Rod, an Engine, Pump, Ice Machine, Air Compressor, Steam Hammer, Rotary Rod or any rod that has to be packed, and keep it tight without pressure or friction, as it works automatically.

We will prove this by yourself. If you will send for enough to pack a rod, we will send it on 30 days' trial, and prove to you that the "Sensible" Automatic Packing is the "Best" made, therefore is "Cheapest."



AFTER USING.

SOLE MAKERS:

Sensible Automatic Packing Co., 63 So. Canal St., Chicago, Ill.

The Adams & Price Locomotive & Machine Works, at Nashville, Tenn., which was burned recently, will likely be rebuilt.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock, P. M., on the 29th day of November, 1890, for all the labor and material and fixing in place complete, the low-pressure, return circulation, steam heating and ventilating apparatus, for U. S. Court House, Post Office, etc., building at Huntsville, Ala.

The constant bringing out of new ideas for the saving of time and labor in the working of wood of all kinds has given the Egan Co., of Cincinnati, O., the most commanding position of any concern in their line in the world. Their productions are famous in all climes and nations and are always the latest forms for economical and perfect work. They can supply almost any want.

Secaucus Furnace, at Secaucus, Wis., has made a splendid record for an all anthracite furnace. The production of the furnace, which is 65x17 feet, was an average of 587 tons per week during the past five weeks, with an average fuel consumption of a little less than one ton three hundred-weight per ton of iron. Last week the furnace made 612.5 tons. No hard iron was made during the five weeks in question.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock, P. M., on the 4th day of December, 1890, for all the labor and material required for the excavation, concrete foundations, stone and brickwork of the basement and area walls, first floor iron beams and girders and columns in basement for the U. S. Court House, Post Office and Custom House building at Bay City, Mich.

A meeting of the citizens of Tuskaloosa, Ala., was recently held to take steps toward securing the location there of the Government factory for making heavy ordnance. Gen. S. A. Wood presided over the meeting and resolutions were passed authorizing him to appoint a committee of thirteen, of which Col. R. A. Hardaway, of the University of Alabama, is to be chairman, to invite the Board of Army and Navy Officers to visit Tuskaloosa, and to lay before them the advantages which this place possesses for the manufacture of the big guns.

Ebert Bros., Detroit, Mich., manufacturers of and dealers in all kinds of roofing, inform us that they have had a large run of orders. They have shipped their goods to various points in New York, Vermont, Pennsylvania, Northern Ohio, Missouri, Iowa, North Dakota, Wisconsin, Winnipeg and Canada; also covered Michigan pretty thoroughly. Having had over twenty years' experience as practical roofers, they are able to determine just what kind of roof is best adapted to building, and as all orders are executed under their personal supervision, their customers will have no trouble in laying the roofing. They have a large stock of sheet, and with solid backing they are bound to make business a success.

Nickel Plate Thanksgiving excursions, Nov. 26th and 27th, good returning until Dec. 1st. One fare for round trip. City ticket offices 224 Bank St., 598 Pearl St., and depots.

NEW YORK TRIBUNE. 1891.

The Tariff and the Farmer.

The Tribune will devote much space during 1891 to the Tariff as it affects the Farmer and the Mechanic.

Hon. Roswell G. Horr, of Michigan, has been added to the Tribune's staff of Tariff writers for this purpose. He will, through the columns of The Tribune, devote himself to this topic, and will invite and answer questions upon points which perplex the American Farmer and Mechanic. He will also, so far as other duties will allow, attend Farmers' Institutes and agricultural gatherings the coming winter and spring, and expound the principles of the Tariff.

Those who desire the presence of Mr. Horr at Farmers' Institutes, etc., are invited to communicate promptly with The Tribune.

Young Men who wish to Succeed.

Many a man feels the lack of early direction of his energies and early inculcation of the maxims which promote the formation of character and success in after life. Every such man would gladly see the young men of to-day better guided in youth than he was. The Tribune has planned the following series of valuable articles, which will appear in this paper only:

What shall I Do? By S. S. Packard, President of Packard's Business College.

Suggestions for the Boys on the Farm who are Ambitious. By the Hon. J. H. Brigham, of Delta, Ohio, Master of the National Grange.

Education without the Help of a College. By President C. K. Adams, of Cornell University.

A Continuation of "How to Win Fortune." By Andrew Carnegie, whose remarkable article of last Spring was so full of encouragement to poor men.

Multiplicity of Paying Occupations in the United States. By the Hon. Carroll D. Wright, Commissioner of the Department of Labor.

A Talk with American Boys. By P. T. Barnum, of Bridgeport, Conn., the great American showman, temperance lecturer, traveler and writer.

Examples in the History of our own Country. By Gen. A. S. Webb, the gallant soldier of Gettysburg and Spottsylvania and College president.

Importance of Good Manners. The views of Ward McAllister.

A College Education good for all; what is best for those who cannot get it. By President William Pepper, University of Pennsylvania.

The Tribune will print from week to week, well-considered answers to any questions which young men or women, in any part of the country, may ask.

Vital Topics of the Day.

Present Needs and Future Scope of American Agriculture. By the Hon. Jeremiah Rusk.

Proper Function of the Minority in Legislation. By the Hon. Julius C. Burrows, Kalamazoo.

Village Improvement Associations, their practicability in Rural Districts, with the story of certain Model Villages. By the Hon. B. G. Northrop, of Clinton, Conn.

Principle in Politics and the Virtue of Courage. By the Hon. James S. Clarkson, of Iowa.

Influences of the Labor Movement upon Human Progress. By Samuel Gompers, President of the American Federation of Labor.

America's Suburban and Rural Homes. By George Palliser, of New York.

Warehouses for Farm Products. By L. L. Polk, President of the National Farmers' Alliance.

Glaciers of the United States. By Professor Israel C. Russell, of the United States Geological Survey and explorer of Alaska.

Other Features.

During 1891 The Tribune will print a valuable series of articles, written by his own traveling correspondent, on the agriculture of the United States, with explanations of a large number of model farms.

A special correspondent, a practical farmer, is now in France, visiting the farms and farm-buildings of that thriftiest of the agricultural nations of the world. He will report upon the dairy, grain, stock and other branches of French farming in illustrated articles.

Mrs. Annie Wittenmeyer, President of the Woman's Relief Corps, will contribute a column of notes and news to The Tribune's G. A. R. page, every week.

Admirable letters of travel in the Southern States, illustrated with pictures, will be printed, describing the South as it exists to-day.

All the regular features will be continued.

The Home Circle columns will be varied by frequent illustrated articles on home decoration, fashions and other subjects of intense interest to women. Written principally for people with little money.

Mrs. Bayard Taylor, the widow of Bayard Taylor, will write articles on Cookery. She is a remarkable housekeeper, with a scientific as well as practical knowledge of her subject.

Steinitz, the great chess champion of the world, will supply a column a week on the greatest and purest of all the games of the home.

Foreign letters, good stories, the news of the day, the best of market reports, book reviews and literary news, witty jokes, etc., etc.

The Tribune is printed in large type and broad columns, and is the easiest paper to read in the country.

Premiums.

Premium List for 1891, containing many new and useful articles, will be sent to any applicant, free.

Prizes for Large Clubs.

Club raisers are invited to write to this office for The Tribune's new Terms to Agents.

Subscriptions.

The Weekly, $1.00 a year; free for the rest of 1890. Semi-Weekly, $2.00; free for the rest of 1890. Daily, $10.00. Sunday Tribune, $2.00. Tribune Monthly, $2.00. Sample copies free.

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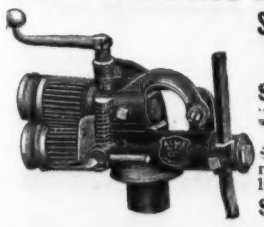

Small Novelties AND TOYS, Patent STOVE-PIPE CRIMPERS, Folding Camp Stools, etc. Correspondence solicited.

Springfield, O.

A GREAT AMERICAN MAGAZINE.

The Success of "The Century" and Its Plans for 1891.

THE CENTURY MAGAZINE is now so well known that to tell of its past success seems almost an old story. The *N. Y. Tribune* has said that it and its companion, *St. Nicholas for Young Folks*, issued by the same house, "are read by every one person in thirty of the country's population"—and large editions of both are sent beyond the seas. It is an interesting fact that a few years ago it was found that seven thousand copies of THE CENTURY went to Scotland,—quite a respectable edition in itself. The question in England is no longer, "Who reads an American book?" but "Who does not see the American magazines?"

A few years ago THE CENTURY about doubled its circulation with the famous War Papers by General Grant and others, adding many more readers later with the Lincoln History and Kennan's thrilling articles on the Siberian Exile System. One great feature of 1891 is to be

"THE GOLD HUNTERS OF CALIFORNIA,"

describing that remarkable movement to the gold fields in '49 in a series of richly illustrated articles *written by survivors*, including the narratives of men who went to California by the different routes, accounts of the gold discoveries, life in the mines, the work of the vigillance committees (by the chairman of the committees), etc., etc. General Fremont's last writing was done for this series. In November appears the opening article, "The First Emigrant Train to California,"—crossing the Rockies in 1841,—by General Bidwell, a pioneer of pioneers. Thousands of American families who had some relative or friend among "the Argonauts of '49," will be interested in these papers.

MANY OTHER GOOD THINGS ARE COMING,

the narrative of an American's travels through that unknown land Thibet (for 700 miles over ground never before trod by a white man), the experiences of escaping War-Prisoners; American Newspapers described by well-known journalists; accounts of the great Indian Fighters, Custer and others; personal anecdotes of Lincoln, by his private secretaries; "The Faith Doctor," a novel by Edward Eggleston, with a wonderfully rich programme of novelettes and stories by most of the leading writers, etc., etc.

It is also announced that THE CENTURY has purchased the right to print, before its appearance in France or any other country, extracts from advance sheets of the famous Talleyrand Memoirs, which have been securely preserved for half a century—to be the first given to the world through the pages of an American magazine. All Europe is eagerly awaiting the publication of this personal history of Talleyrand—greatest of intriguers and diplomats.

The November CENTURY begins the volume, and new subscribers should commence with that issue. The subscription price ($4.00) may be remitted directly to the publishers, THE CENTURY CO., 33 East 17th St., New York, or single copies may be purchased of any newsdealer. The publishers offer to send a free sample copy—a recent back number—to any one desiring it.

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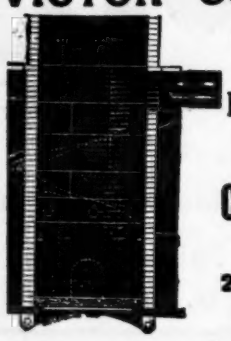

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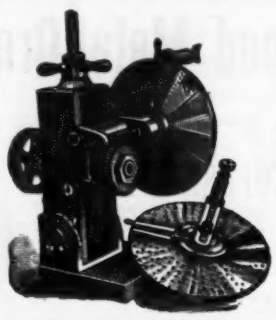

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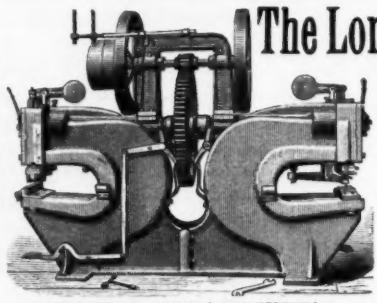

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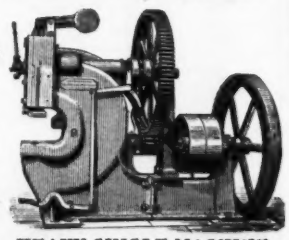

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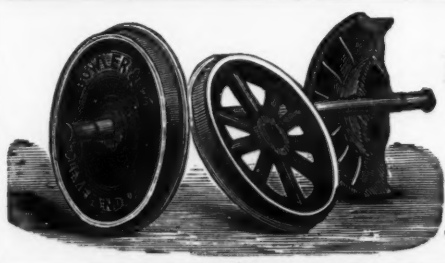

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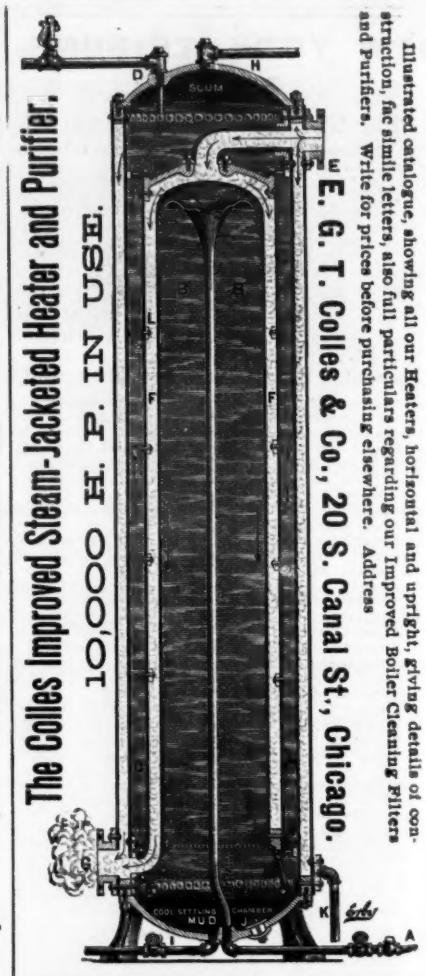

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CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1, foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 75@16 50; Southern Coke No. 3 Foundry, $15 25@16 00; Southern Coke No 1, Softeners, $15 75@16 50; Southern Coke No. 2, Softeners, $14 75@15 50; Ohio Silveries No. 1, $18 00@18 75; Ohio Silveries No. 2, $17 00@17 75; Ohio Strong Softeners No. 1, $18 50@19 50; Ohio Strong Softeners No. 2, $17 75@18 75; Lake Superior Charcoal Nos. 1 to 6, $19 25@20 00; Tennessee Charcoal No. 1, $19 00@20 00; Tennessee Charcoal No. 2, $18 00@19 00; Southern Standard Car Wheel, $22 00@24 50; Tennessee Standard Car Wheel, $19 50@20 50.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 25@15 75; Hanging Rock Coke, No. 1 foundry, $17 00@18 00; Jackson Co. Stone Coal, No. 1 foundry, $17 00@17 50; Tennessee Charcoal, No. 1 foundry, $17 00@18 00; Hanging Rock Charcoal, No. 1 foundry, $21 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 25@13 50; Standard Southern Coke, mottled, $12 75@13 00; Cold Short Southern Coke, grey forge, $13 00@13 50; Strong Ohio Neutral Coke, grey forge, $15 50@16 00. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $21 00@22 00; Tennessee Car Wheel, $20 00@20 50; Lake Superior Car Wheel, $20 50@21 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $17 50@00 00; Mahoning and Shenango Valley strong, No. 2 Foundry, $16 50@00 00; Ohio Softener No. 1, $17 50@00 00; Ohio Softener No. 2, $16 50@00 00; Jackson Co Silveries, $18 00@19 00; Lake Superior Charcoal, $20 50@21 00; Tennessee Charcoal, $19 50@00 00; Southern Softener No. 1, $16 50@00 00; Southern Softener No. 2, $15 75@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 50@00 00; Alabama Car Wheel, $23 00@24 00; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $15 00@15 25; Southern coke No. 2, $14 25@14 50; Southern coke No. 3, $14 00@14 25; Mahoning Valley (Lake ore mixtures), $17 75@18 75; Southern charcoal, No. 1, $17 00@17 50; Southern charcoal, No. 2, $16 50@17 00; Missouri charcoal, No. 1, $18 00@18 50; Missouri charcoal, No. 2, $17 00@17 50. FORGE—Neutral coke, $13 75@14 00; Cold short, $13 75@14 00; Mottled, $12 75@13 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $22 00@23 00; Southern (other brands), $18 00@19 00; Lake Superior, $22 50@23 00.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 75@16 25; Southern Coke No. 2, $14 75@15 25; Southern Coke No. 3, $14 25@14 75; Southern Grey Forge, $13 75@14 25; Southern Charcoal No. 1, $17 50@18 00; Southern Charcoal No. 2, $17 00@17 50; Missouri Charcoal No. 1, $16 00@16 50; Missouri Charcoal No. 2, $15 50@16 00; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $21 75@22 25; Southern, $19 00@22 50. CONNELLSVILLE COKE—East St. Louis, $5 65; St. Louis, $5 80.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $20 00@20 50; Lake Superior (coke) Bessemer, $18 50@18 75; Katahdin (Maine charcoal), $23 50@24 00; Lake Superior Coke, Foundry, all ore, $18 50@19 50; Lake Superior Coke, Foundry Cinder Mixed, $00 00@00 00; Standard Ohio Black Band, $18 25@18 75; Southern No. 1, $16 50@17 00; Southern Gray Forge, $14 50@15 00; Jackson County (Ohio) Silvery, $19 00@19 50 Old Car Wheel, $00 00@00 00. Connellsville Coke, $4 80.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 75@15 25; Southern Coke No. 2 Foundry $14 25@14 75; Southern Coke No. 3 Foundry $13 75@14 25; Grey Forge $13 25@13 75; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $17 50@18 50; Southern Car Wheel, Standard brands, $22 50@23 50.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $17 00@17 25; No. 2 Foundry, $16 00@16 25; Grey Forge, $15 00@15 25; White and Mottled, $14 00@14 25; Warm Blast Charcoal, $18 00@21 00; Cold Blast Charcoal $23 00@27 00; Bessemer, $17 00@17 50

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 95
4½ to 6 by ⅜ to 1 inch	2 05
1¾ to 6 by 1¼ to 2 inch	2 35
1¼ & 1¾ by ⅜ to ¾ inch	2 05
1 & 1¼ by ⅜ to ¾ inch	2 15
⅛, ¼ and ⅜ by ⅜ to ⅝ inch	2 35

Round and Square.

1 to 1⅜ inch	1 95
2 to 2⅜ inch	2 15
2¾ to 3¼ inch	2 45
3⅜ to 4 inch	2 95
4¼ to 4½ inch	3 45
4¾ to 5 inch	3 65

Oval.

⅜ to 1¼ inch	2 35
⅜ to ¾ inch	2 55
⅞	2 75
1	3 15

Half Oval and Half Round.

1¼ to 3 inch	3 05
⅜ to 1¼ inch	2 65
⅜ to ¾ inch	3 25
⅞	3 45
1	4 95

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	2 15
1 to 1¾ by ¼ and 5-16 inch	2 25
½ to ¾ by ¼ and 5-16 inch	2 45
⅜ to ⅝ by ¼ and 5-16 inch	2 95

Hoops.

1¼ to 4, Nos. 13 to 15	2 75
1¼ to 2, Nos. 16 to 18	2 85
1¼ to 2, No. 19	2 95
1¼ to 2, No. 20	3 05
1¼ to 2, No. 21	3 15
1¼ to 2, No. 22	3 25
15-16, 1 and 1⅛, Nos. 13 to 15	2 95
15-16, 1 and 1⅛, Nos. 16 to 18	3 05
15-16, 1 and 1⅛, Nos. 19 and 20	3 15
15-16, 1 and 1⅛, No. 21	3 25
15-16, 1 and 1⅛, No. 22	3 35
⅞, Nos. 13 to 15	3 15
⅞, Nos. 16 to 18	3 25
⅞, Nos. 19 and 20	3 35
⅞, No. 21	3 45
⅞, No. 22	3 55
13-16, Nos. 13 to 15	3 35
13-16, Nos. 16 to 18	3 45
13-16, Nos. 19 and 20	3 55
13-16, No. 21	3 65
13-16, No. 22	3 75
¾, Nos. 13 to 15	3 45
¾, Nos. 16 to 18	3 65
¾, Nos. 19 and 20	3 75
¾, No. 21	3 85
¾, No. 22	3 95
11-16, Nos. 13 to 15	3 65
11-16, Nos. 16 to 18	3 85
11-16, Nos. 19 and 20	3 95
11-16, No. 21	4 05
11-16, No. 22	4 15
⅝, Nos. 13 to 15	3 95
⅝, Nos. 16 to 18	4 15
⅝, Nos. 19 and 20	4 25
⅝, No. 21	4 35
⅝, No. 22	4 45
⅝, No. 23	4 65

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 35
1¼ to 6 by Nos. 11 and 12	2 45
1 to 1¾ by ⅛ to 3-16 in	2 55
1 to 1¾ by Nos. 11 and 12	2 65
⅞ and 13-16 by ⅛ to 3-16 in	2 85
⅞ and 13-16 by Nos. 11 and 12	2 95
¾ and 11-16 by ⅛ to 3-16 in	3 15
¾ and 11-16 by Nos. 11 and 12	3 25
⅝ and 9-16 by ⅛ to 3-16 in.	3 45
⅝ and 9-16 by Nos. 11 and 12	3 55
½ by ⅛ to 3-16 in	3 75
½ by Nos. 11 and 12	3 85

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 12	2 95
⅝ inch, " " " 13 and 14	3 15
¾ inch, " " " 11 and 12	3 25
¾ inch, " " " 13 and 14	3 45

Sheet Iron.

No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

Above includes plates 90 inches wide.

90 to 96 in. wide	½c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1½c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅞ and 2⅜ to 3 in	10½
3⅛ to 4 in	11
⅜ to 11-16 and 4⅛	10½
⅛ to 6 in	11½
¼ to 9-32 and 6¼ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅛ thick	9

Bessemer and O. H. Steel.

Machinery	base price,	3 00
Tire	"	3 00
Spring	"	3 50
Sleigh Shoe	"	3 00
Toe Calk	"	3 25
Cutter Shoes, tapered and burr.	"	3 25

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ½, ⅝, 11-16 and ¾ inch diam	4 00

SCRAP IRON AND OLD METAL.

	NET TONS
No. 1 R. R. wrought scrap	$21 00
No. 1 wrought scrap	18 50
No. 1 Machine cast scrap	13 00
Iron axles	25 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	9 00
Uncut wrought iron boilers	13 00
Steel boiler plates	17 00
Grate Bars	9 00
Pipes and flues (Clean)	13 50
Tank iron	13 50
Hoop and band iron	10 00
Sheet iron	9 50
Wrought drillings	11 50
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	13 00

CLEVELAND ROLLING MILL CO.,
MANUFACTURERS OF
BESSEMER STEEL RAILS,
Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

The Cambridge Iron & Steel Co.,
MANUFACTURERS OF
IRON AND STEEL SHEETS,
CAMBRIDGE, OHIO.

Cleveland Iron Min'ng Co.,
Mercantile Bank Building,
CLEVELAND, O.
Organ'zed 1850.
Total Production to Date, 4,200,000 Gross Tons.
Dealers in Lake Superior iron ore from their own mines at Ishpeming, Mich
Specially adapted for making strong, tough iron, and for carrying large proportions of mill cinder and cold short ores.

H. N. HILL & CO.
Manufacturers' Agents' for
BOILER TUBES.
PLATE STEEL.
BOILER RIVETS.
NORWAY IRON RIVETS.
SMOKE STACK AND GASOMETER RIVETS.
BAR IRON.
BAR STEEL.
STEEL AND IRON ANGLES.
SHEET IRON.
SHEET STEEL.
RAILROAD AND BOAT SPIKES.
WROUGHT IRON PIPE AND FITTINGS.
PULLEYS, HANGERS AND COUPLINGS
BEAMS AND CHANNELS.
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GALVANIZED SHEET.
PORTABLE FORGES.
RAILROAD AND MACHISTS' SUPPLIES.
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Telephone 98. CLEVELAND, O.

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DEALERS IN
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Rooms 716, 717, 718, 719 Perry-Payne Bld'g,
CLEVELAND, O.

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WM. B. FRANKLIN, Vice-President.
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FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,
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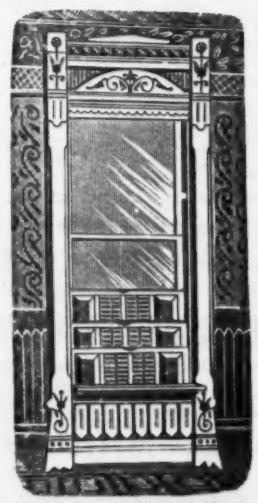
J. H. OUTHWAITE & CO.,
Exclusive attention given to
LAKE SUPERIOR AND MENOMINEE RANGE
Iron Ore,
Perry-Payne B'ld'g. Cleveland, O.

Hartman's Patent Inside Sliding Window Blind

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The Only Blind that is furnish'd with an automatic Burglar-Proof Lock, free of charge. This is an item of immense magnitude, and may save you many times the cost of blinds & perhaps life also, and the only blind that gives entire satisfaction.
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Pig and Bar Iron,
CLEVELAND, OHIO.

Pickands, Mather & Co.,
IRON ORE - -
—AND—
- - PIG IRON
Corner Bank and Superior Streets,
CLEVELAND, O.

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COMMISSION DEALER IN
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AND METALS.
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PITTSBURGH & WHEELING COAL CO.,
MINERS AND SHIPPERS OF
Ohio Steam Coal and Coke.
Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.
Office, 6 Mercantile Bank Building,
CLEVELAND, OHIO.
Lake Shipping Point, Lorain O.
JAS. PATTERSON, Sales Agent.

ONE OF DUNN'S HOISTING MACHINES, with over 40 feet of chain. Good as new; capacity, 600 lbs. Address Dunn, care Iron Trade Review, Cleveland, O.

MACHINERY SUPPLY MARKET.

Anvils.

American ..... ₩ lb 9@10
Wrights ..... ₩ lb 9¼

Bellows.

Blacksmiths' { Hill's ..... dis 40
Bullock's .... dis 50&10
Moulders' ..... dis 40@40&10
Hand ..... dis 40&10@50

Belting.

Boston Belting Co's standard ..... dis 70
" " " extra ..... dis 60&5
" " " best ..... dis 55
Hoyt's Short Lap ..... dis 45
Cleveland Rubber Co. extra standard .dis 60&10
Shultz Raw Hide Leather Belting, single, ... dis 40
Shultz Raw Hide Leather Belting, double, and Light Double ..... dis 40
Standard, oak tanned ..... dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's ..... dis 20
Boston Blower Co. ..... dis 35
Buffalo ..... dis 35

Borax.

..... ₩ lb 9¾@10¾

Chalk.

White ..... ₩ gross 50
White Crayon ..... ₩ gross 12@12½ dis 10
Red ..... dis 70
Blue ..... dis 85

Chucks.

Cushman's 4 Jaw Independent ..... dis 45
" Combination ..... dis 40
" Geared Scroll ..... dis 30
" 2 Jaw Brass Workers. ..... dis 30
" Drill ..... dis 35
Wescott's Scroll Combination ..... dis 33⅓
" Independent ..... dis 40
" Little Giant Drill ..... dis 30
Horton's Universal ..... dis 40
" Independent ..... dis 45
Whiton's Independent ..... dis 45
National Combination ..... dis 40
Sweetland " ..... dis 40
Almond Drill ..... dis 20
Morse " ..... dis 15
Skinner's Combination Lathe ..... dis 33⅓
" Independent Lathe ..... dis 40
" Universal Lathe ..... dis 40
" Drill ..... dis 15

Cutters and Reamers.

Cleveland ..... dis 10@15
Pratt & Whitney ..... dis 10@15
Standard ..... dis 10@15
Brown & Sharpe, Milling Cutters ..... dis 15
" " Gear Cutters ..... dis 15

Crowbars.

Cast Steel ..... ₩ lb 4
Iron, steel points ..... ₩ lb 3½

Drill and Drill Sockets.

Twist drills ..... dis 50&10
Morse Taper and Straight shank to 1⅜" ..... dis 50&10
Morse Taper and Straight shank Larger than 1⅜" ..... dis 25
Drill Sockets ..... dis 25
Standard Twist Drills ..... dis 55@55&5
Cleveland " " ..... dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, C. F. F.	F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4¼c	5¼c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6¾c		5 c
10 lb cans, less than 10	10 c	10 c		7¼c

Emery Cloth and Paper.

Barder, Adamson & Co. ..... dis 45@50
H. H. Barton ..... dis 50@55 &5

Emery Wheels.

Detroit ..... dis 55@60
Norton's ..... dis 55@60
Grant ..... dis 55@60
Sterling ..... dis 60
Celluloid ..... dis 10&33⅓
Northampton ..... dis 55
Crystal ..... dis 65@70
Vitrified ..... dis 60
Vulcanite ..... dis 10&10

Files.

Nicholson ..... dis 60&10@60&10&10
" X. F. ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
Arcade ..... dis 60&10@60&10&10
Disston's ..... dis 65@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 60
Industry File Works, hand cut ..... dis 50

Hammers.

P. S. W. ..... dis 40
Atha new list, Jan. 15, 1887 ..... dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list ..... dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3½	3⅛
Hexagon	15⅜	11¼	8¾	6	5¼	5	
Washers	9	8	7	5	4½	4⅛	4⅛

In lots less than 100 lbs, ₩ lb add ¾c., 1lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887 ..... dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots $2.30
{ Less than car lots $2.40

Oilers.

Zinc and Tin ..... dis 60
Brass and Copper ..... dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz ..... dis 10@10&10

Packing, Steam.

Boston Belting Co. ..... dis 60
American Packing Hemp ..... ₩ lb 10@11
Russia Packing " ..... ₩ lb 14
Italian Packing " ..... ₩ lb 13@14
Plumbago Piston ..... ₩ lb 40
Morrison's " ..... ₩ lb 50
Square Flax " ..... ₩ lb 50
Sheet Rubber ..... ₩ lb 2&24
Excelsior Rubber ..... ₩ lb 48

Picks.

Railroads, 5 to 6 lbs ..... $12 dis 60
" 6 to 7 lbs ..... $13 dis 60

Pulleys.

Iron Pulleys, Walker List ..... dis 45
Medart Pulleys ..... dis 55
Split Wood Pulleys ..... dis 50@55

Rivets.

Iron, Thousand, list November 17, ... dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17 ..... dis 50
Copper ..... dis 50@50&10

Rope.

Manilla, ½ inch and over ..... ₩ lb 15¾
Sisal, ½ inch and over ..... ₩ lb 13¾

Sand Paper.

B. A. & Co. ..... dis 45@50
H. H. Barton's ..... dis 40@45
New England Flint ..... dis 40@50
Barton's Garnet ..... dis 20

Saws.

Disston's Circular ..... dis 45
" Band ..... dis 20
" Scroll ..... Net
Hack Saw Stubs ..... dis 20
" " Eureka ..... dis 20
" " Star ..... dis 20
Saw Swages Disston's ..... dis 20
Atkins' Cicular Saws ..... dis 50
" Mill, Mulay and Drag Saws .dis 40&10
" Wood Saws ..... dis 40&10
" Silver Steel Diamond Cross-cut Saws ..... dis 70c per ft
" Dexter Cross-cuts ..... dis 50c "
" Diamond " ..... dis 30c "
" Tuttle Tooth Cross-cuts .dis 25c "
" One-man Cross-cuts ..... dis 32c "
No. 1 Handles ..... dis 23c per pair
No. 6 " ..... dis 16c "
Excelsior Saw Tools ..... $6 per doz
Perfection " ..... $15 "
Detroit Saw Works, Circular ..... dis 50
" " " Band ..... dis 25
" " " Mulay ..... dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron ..... dis 50
Round head iron ..... dis 40
Flat head brass ..... dis 45
Round head brass ..... dis 35
Square Cap ..... dis 65
Hexagon Cap ..... dis 60
Set C. H. C. P. ..... dis 70
Machine, flat head, iron ..... dis 65
Machine, round head, iron ..... dis 60
Bench and hand—
Lag or coach ..... dis 75@75&10
Coach, patent gimlet point ..... dis 75

Shovels and Spades.

Ames' list November 1, 1885 ..... dis 20
Dennis ..... dis 5.25
Hussey & Binns, railroad ..... dis 8.00

Taps.

Cards, Hand and Nut to 2 in ..... dis 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps ..... dis 55
Pipe Taps to 2½ in ..... dis 70
Stay Bolt Taps ..... dis 25
Stove Bolt Taps ..... dis 50
Pulley Taps ..... dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅛ lb Balls	21c@29c	
No. 18 " " ¼ and ⅛ "	18c@28c	
No. 36 " " ¼ and ⅛ "	16c@27c	
2-Ply Hemp, ¼ & ⅛ lb Balls (Spring Twine)	11¾c	
3-Ply " 1lb Balls	12@12¾c	
3-Ply " 1½ lb Balls	11@11¾c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box ..... dis 60
Parker's ..... dis 20@25
Prentiss ..... dis 20
Stephen's ..... dis 25@30
Barrett's ..... dis 30
Miller's Falls ..... dis 40
Merrill's ..... dis 10@15
Howard ..... dis 30

Wire.

New List, Jan. 18, 1884

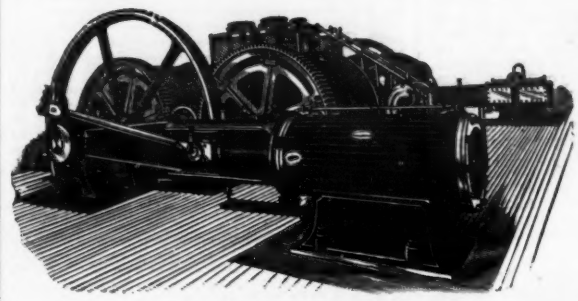
Brass and copper ..... dis 20@25
Bright and annealed, Nos. 0@18 ...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " ..... dis 65&5
Tinned market Nos. 0 to 18 ..... dis 67½
Cast steel ..... dis 50
Tinned Broom Wire ..... dis 70&5@70&10
Annealed Fence, Nos. 8 and 9 ..... dis 75
Annealed Grape, Nos. 10 to 14 ..... dis 75
Stub's Steel Wire regular ..... $6.00 ₩ lb dis 3

Wrenches.

Coe's genuine, ... dis 50
Girard Standard ..... dis 70&10
Agricultural ..... dis 75&10
Mechanics' ..... dis 55&10,& 5
Bemis & Call's Combination ..... dis 35
Donohue's Engineers ..... dis 20&10
Lamson & Sessions Engineers ..... dis 60
Billings & Spencer's Drop Forged ..... dis 10
William's " " ..... dis 10
Alligator " " ..... dis 40

Webster, Camp & Lane Machine Co.

MANUFACTURERS OF



Mining Machinery,

Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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134 N. Main St., AKRON, OHIO.

Magnetic Concentration of Iron Ore.

Ball-Norton (Monarch) Electro Magnetic Separator.

Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

H. E. COLLINS & CO., Agents Magnetic Separator Co.,

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CLEVELAND, O.

LIGHT AND HEAVY

IRON CASTINGS.

DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.

DUPLICATE WORK A SPECIALTY

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MANUFACTURER OF

VENTILATING FANS AND BLOWERS, HANGERS,

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Detachable and Roller

CHAIN BELTING,

MADE IN ALL SIZES OF

Malleable Iron and Steel,

DESIGNED FOR

Elevators, Conveyors, Drive Belts, etc.

For handling materials of all kinds.

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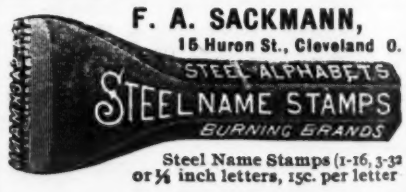

Steel Name Stamps (1-16, 3-32 or ⅛ inch letters, 15c. per letter

PATENTS OSBORNE & CO., Patent Attorneys, 29 Euclid Ave., Cleveland, O. U. S. and Foreign Patents Procured. Patent Cases Litigated. Searches and Opinions as to Scope, Validity, Infringement and Title of Patent Send for pamphlet.

PATENTS

WM. M. MONROE,

SOLICITOR & COUNSELLOR, City Hall Room 48.

PATENTS THOMAS P. SIMPSON, Washington, D. C. No atty's fee until Patent obtained. Write for Inventor's Guide.

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On or about December 1, 1890, we will remove our entire plant to the new Vincent building, on Vincent street, between Music Hall and the Hollenden, now occupied by the Dangler Stove & Manufacturing Co. We shall take the entire building, which has a frontage on Vincent street of 47 feet, a depth of 100 feet, and an aggregate floor space of 24,000 square feet. Of this space we will rent to the right parties about 5,000 square feet, with power. The building is located in the centre of the important business district on Euclid avenue and Superior street, and was especially designed and constructed for power purposes. It is lighted on three sides, is equipped with large freight elevator, is heated with steam, and has gas and water on all five floors. Terms reasonable. Apply to

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CRO. ST. CLAIR AND WOOD STREETS., CLEVELAND, O.

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OUR SYSTEM IS INSURABLE IN ALL INSURANCE COMPANIES.
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Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩ doz $8 00
Others.....₩ doz $7 00
Full polished.....₩ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 7c&5
Loose joint, jap. with acorns.....dis 7c&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 7c&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 7c&5
Wrought, loose joint, broad.....dis 7c&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 7c&5
Light inside blind.....dis 7c&5
Loose pin.....dis 70&5
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Eberts Bros., Detroit.	Per roll of 500 sq. feet.
No. 1—Slaters'	$1.25
"A," Stringed Roofing, Light	1.50
"B," Stringed Roofing, Medium	1.75
"C," Stringed Roofing, Heavy	2 00
Stringed, Rosin-Sized	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ₩ ton	$30 00
Asphaltum, Fine G ade, ₩ lb	.08
Coal Tar Felt, 1 Ply, ₩ lb	.02
Coal Tar Felt, 2 Ply, ₩ roll 108 sq ft	1 42½
Coal Tar Felt, 3 Ply, ₩ roll 108 sq ft	1.85
Roofing Pitch, ₩ gal	.09

Chains.

Revised List.

Trace, 6½-10-2.....₩ pair 1.03
Trace, 6½-10-3.....₩ pair .92 } .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ lb 5¼@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch	4 00	4 50	5 00
10 and 11½ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ₩ lb.	23	24	25	26	28	dis 40
Putnam, ₩ lb.	18	19	20	21	23	dis 15

Essex.....dis 25&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 70&10
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

Plumbs and Leve s.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$....dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₩ gross $15 00

Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

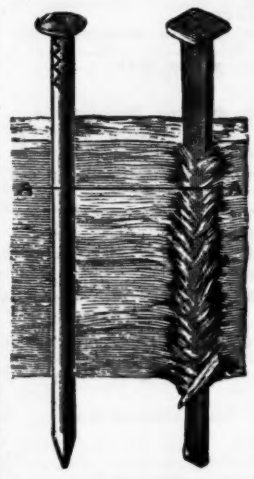
Squares.

Steel and iron } dis 75&10@80
Nickel plated }
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 70&10&10
Steel carpet tacks all kinds.....dis 70&10&10
Swedes iron carpet tacks, all kinds dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 45&10
Finishing nails.....dis 6
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nai s.....dis 66&10&10
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10



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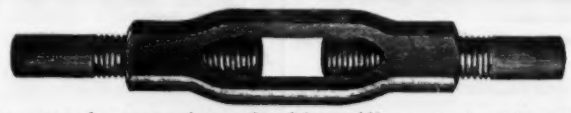
SEND FOR CATALOGUE.

TURNBUCKLES.



Wrought iron open hexagonal turnbuckles. The only buckle made that has a perfect wrench hold.

Made from charcoal iron.

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Sole Manufacturer.

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A COMPETENT FOREMAN for a machine shop employing about 50 men; the foreman to work under the instruction of a general superintendent. Salary moderate Works located in a small and pleasant town near Cleveland. Applicant must came well recommended as to character, experience and ability. The works are engaged in manufacturing heavy machinery. A permanent and desirable opening for a good man. Address, stating age and giving experience,
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81—10 to 12 h. p.	Side Crank	100
104—150 to 200 h. p.	Horizontal Variable Cut-off	700
130—25 h. p.	Horizontal Side Crank	200
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197—10 h. p.	Balanced Side Crank	100
202—20 h. p.	Center Crank	240
207—20 h. p.	Center Crank	240
208—20 h. p.	Center Crank	240
209—12 h. p.	Center Crank	160
210—16 h. p.	Center Crank	200
211—16 h. p.	Center Crank	200
203—20 h. p.	Center Crank	240
204—20 h. p.	Center Crank	240
205—20 h. p.	Center Crank	240
206—20 h. p.	Center Crank	240

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77—8 h. p.	Tubular	100
163—75 h. p.	Tubular	450
123—35 h. p.	Tubular, 2-flue	225
149—25 h. p.	Tubular	275
175 & 176—2 75 h. p.	Steel Horizontal Tubular, each	550
170—75 h. p.	Horizontal, 6-flue	325
183—40 h. p.	Horizontal Tubular	350
199—30 h. p.	Horizontal Steel Tubular	300

MOUNTED PORTABLE OUTFITS.

192—16 h. p.	Portable on High Wheels	500
181—20 h. p.	Portable on High Iron Wheels	600
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63—12 to 14 h. p.	Ver. Port. Engine & Vert. Boiler	250
114—25 h. p.	Portable Engine and Boiler, skids	400
135—25 h. p.	Portable Engine and Boiler, "	500
154—10 h. p.	Portable Engine and Boiler, "	300
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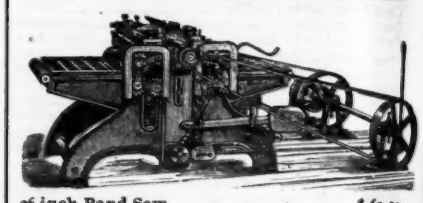

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Pittsburgh Express.....	†1 20 p m	11 10 p m
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(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m.,6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
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Wheeling and Bellaire.	7 45 a m	12 50 p m
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	*11 10 p m	.....
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	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
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No. 66, Mantua Accommo.....	* 4 20 p m
No. 74, Youngst'n Ex.....	† 6 00 p m
No. 68, New York & Pitts. Ex.....	*11 00 p m
	Arrive.
No. 61, N. Y. & Pittsburgh Express...	† 5 15 a m
No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
No. 67, Pittsburgh Accom.....	*12 45 p m
No. 73, Leavitsburgh Local.....	* 2 10 p m
No. 63, New York & Pitts. Ex.....	* 6 50 p m
No. 75, Mantua Accom.....	* 7 20 p m
No. 69, Youngstown Express.....	† 9 10 p m

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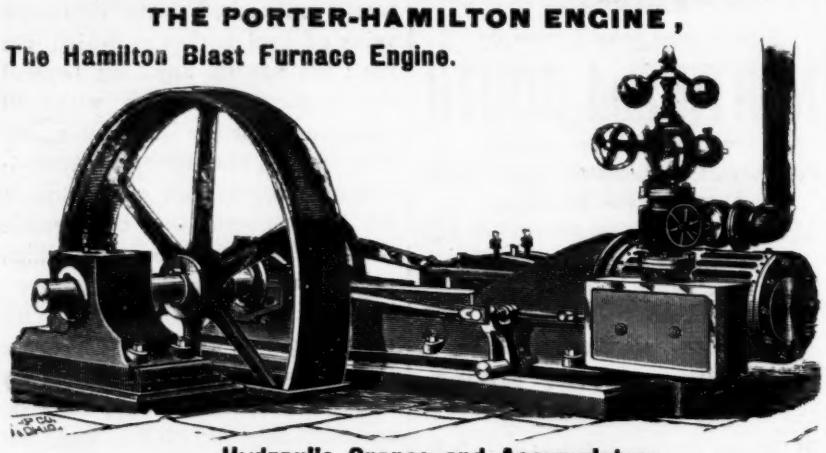

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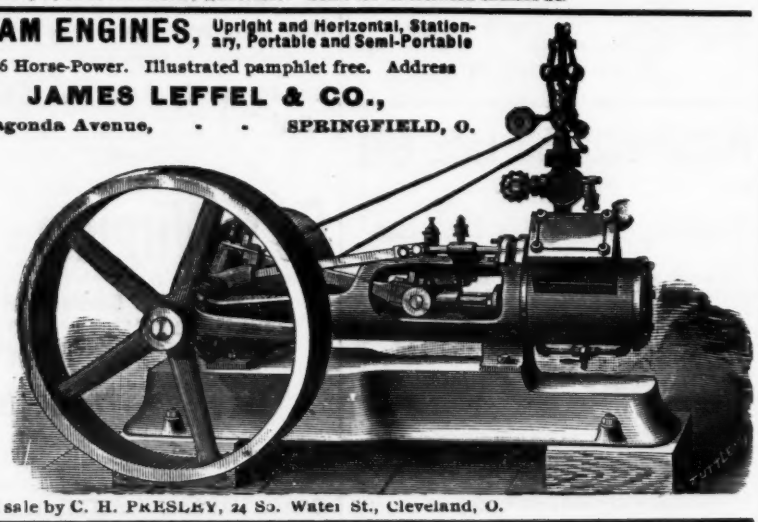

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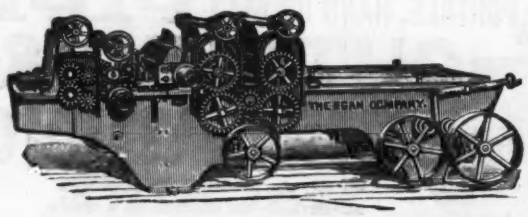

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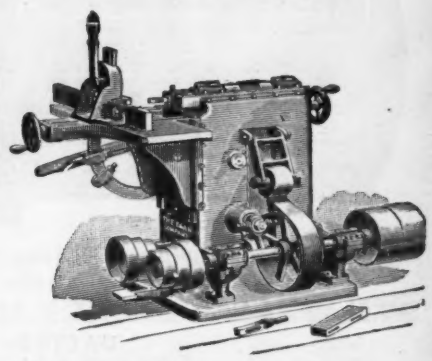

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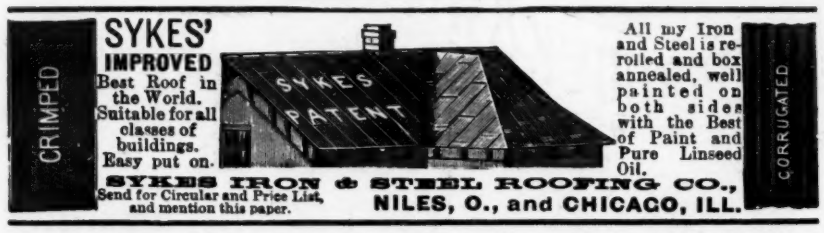
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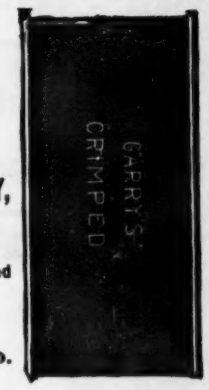

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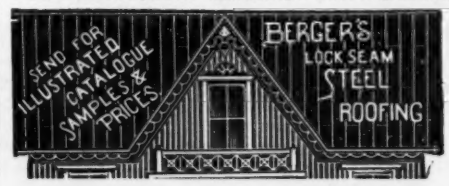

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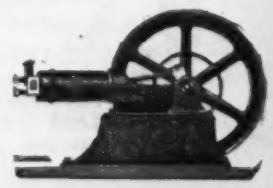

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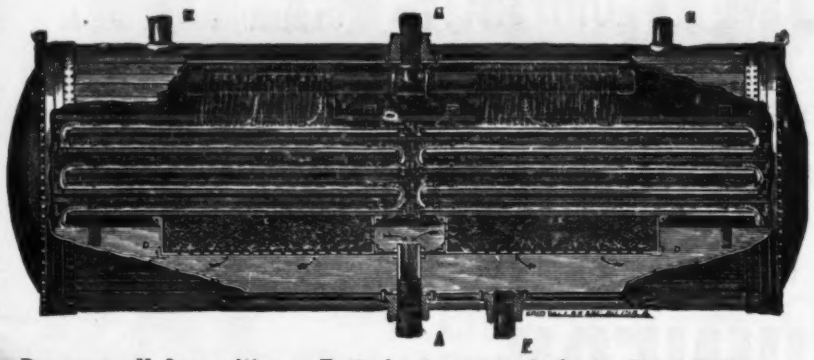

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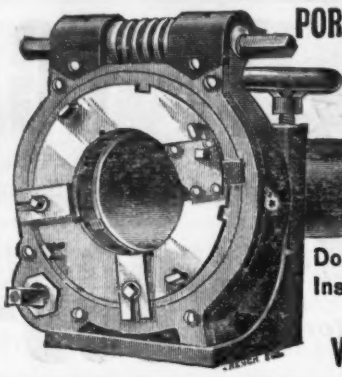

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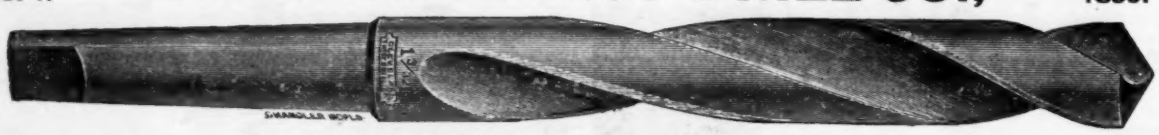

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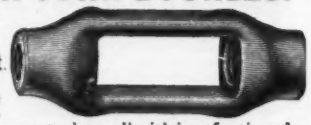

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